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Wm M. Kite
ESSAYS AND OBSERVATIONS,

PHYSIOLOGICAL AND MEDICAL,

ON THE

SUBMERSION OF ANIMALS,

AND ON THE

RESIN OF THE ACOROIDES RESINIFERA,

OR

YELLOW RESIN FROM BOTANY BAY.

TO WHICH ARE ADDED,

SELECT HISTORIES OF DISEASES;

WITH REMARKS.

BY CHARLES KITE.

LONDON:

PRINTED BY G. WOODFALL,

FOR C. DILLY, IN THE POULTRY.

1795.

ESSAYS AND OBSERVATIONS,

PHYSIOLOGICAL AND MEDICAL,

ON THE

SUBMERSION OF ANIMALS,

AND ON THE



ESSAYS OF THE ACCIDENTS OF RESPIRATION,

YELLOW RHEUM FROM BOTANY BAY.

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FOR A. HARRIS, IN THE ROYAL

1795.

ADVERTISEMENT.

THE Effays on the Submerſion of Animals, and on the Yellow Reſin from Botany Bay, have already appeared in the Memoirs of the London Medical Society; but as many applications were made for a ſeparate publication, and as ſeveral friends were diſappointed of copies by the inattention of the printer, it was thought adviſable to republifh them in the preſent form;—if, by making them more generally known, they
ſhould

should become more extensively useful, my intention will be abundantly answered.

I have taken the opportunity of annexing a few select and interesting Histories of Diseases; some of which also have already appeared before the publick; and as recording memorable facts has at all times been recommended and approved, any apology for so doing, is, I apprehend, unnecessary.

Gravesend, March, 1795.

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ON

ON THE

SUBMERSION OF ANIMALS.

TO improve the means of recovering persons apparently dead, a very particular and minute attention to the real state of the vital parts, after respiration has been suspended, seems necessary.

Much has already been said on this very interesting subject, but authors (even those who have written the most recently concerning it) differ so materially in their opinions, that it is by no means easy to discriminate which may be preferable. The point therefore is not so perfectly and satisfactorily decided, or the subject so completely understood, as to preclude farther investigation.

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Under these circumstances I venture to address the Society ; my inducement for requesting their attention is a persuasion that it may be possible to throw considerable light on the subject by noticing some things not yet sufficiently adverted to, and placing others in a clearer point of view than has hitherto been done.

How far I have succeeded I leave to their judgment, whose opinion will be held universally decisive ; but even if I fail in establishing what appears evident to me, I shall at all times have the satisfaction of knowing that my remarks will meet from them a candid reception.

It is unnecessary to prove, what scarce any one at this time doubts, that the suspension or abolition of life in drowned animals, is effected entirely by the operation of the water upon the lungs: I shall therefore proceed to enquire into the manner in which it operates so as to produce that effect.

The only manner in which it appears to me possible, in these cases, for the water to operate, is either by entering the trachea, or by suspending the action of respiration.

In the experiments which I made some time since, and have again lately repeated, in order to determine this point, I have never been able to detect more than a very small quantity of the coloured liquor in which the animal was submersed, if examined when the animal had been only a short time under water; and commonly

no appearance whatever of the liquor was to be discovered in the lungs.

But from the experiments of others, of very considerable respectability, particularly those of M. Louis, Dr. D'Haen, and Dr. Goodwyn, it appears that the liquor has sometimes been found in greater abundance. It must, however, be mentioned, that even with those gentlemen this was not a constant occurrence; it therefore still continues a question, how death was occasioned in the other instances.

Dr. Goodwyn has very much elucidated this part of the subject by a very ingenious and well conceived experiment: he first immersed a cat in quicksilver, and, on opening the body, found half an ounce of quicksilver in the lungs,*
and

* This experiment was performed eight times, but in three instances out of that number no quicksilver was

and an ounce of frothy fluid: having by these means found the quantity of fluid in the lungs of one drowned animal, he endeavoured to determine what effect the same, or a greater quantity of water, would have when introduced into the lungs of a similar animal; two ounces of water, therefore, were introduced into the trachea of another cat. It had immediately a difficulty of breathing, and a feeble pulse; but these symptoms were soon abated, and it lived several hours afterwards without much inconvenience. It was at length strangled, and two

B 3

ounces

was found in the lungs; now it is extremely probable that quicksilver would, on account of its greater specific gravity, be found in the lungs when water would not; which is a farther presumption that water is not often taken in, and never but in a very small quantity; for the quantity of water, equal to the bulk of half an ounce of quicksilver, is only seventeen grains.

ounces and a half of water found in the lungs.

From what has been observed it appears, that although water may sometimes enter the lungs of drowned animals, yet not in a sufficient degree to occasion their death.*

It

* The uncertain occurrence of water in the lungs of animals that have long been in the water, may be thus accounted for. It appears to me that all animals in dying, and I shall particularly shew that those in the act of drowning, make as perfect and complete expiration of all the air in their lungs as they possibly can. In animals who die otherwise than by drowning, the diaphragm and intercostal muscles will contract to their natural state, as all the other muscles of the body do, after death has apparently taken place, and then the external air will necessarily rush in: but animals confined in water are under different circumstances; for if, after this complete expiration, the muscles are contracted, water instead of air will get into the lungs. I have, however, in another place
shewn

It is evident, therefore that the death of drowned animals is to be attributed entirely *to the water intercepting the action of respiration.*

In this opinion I believe all parties are now very well agreed, but they differ extremely respecting the manner in which this suspended action operates.

Respiration being an indispensable requisite for the support of life in the more

B 4

perfect

shewn that water will not, at least in any quantity equal to the air displaced, enter the lungs, till the irritability of the parts about the glottis has entirely ceased, the opening into the lungs then becoming free : if the muscles concerned in respiration are stiff and rigid, that is, if they have really lost the vital principle, the vesicles of the lungs being firmly compressed, will admit scarcely any water ; but if the muscles of the epiglottis lose their power before the respiratory muscles become fixed, the cavity of the thorax will be enlarged, and, in proportion as it is enlarged, water must necessarily enter into the lungs.

perfect animals, any material impediment to it occasions death. The stoppage of respiration acts powerfully on the system in two ways at the same time : i. e. if the lungs are quite empty of air, the chemical action of the air on the blood immediately ceases ; and the blood is also prevented from passing through the lungs.

If respiration be stopped at the end of a common expiration, both these circumstances may continue a short time, as there will be an hundred cubic inches of air in the lungs, in which quantity, it is said, there are about thirty cubic inches of pure air, which is sufficient to carry on the requisite change for a few seconds ; with these hundred cubic inches of air in the lungs they must be considered as in a middle state of dilatation, and will consequently allow the circulation to be continued through them for a short time likewise.

wife. If a larger quantity of air be in the lungs, the chemical action may subsist for a longer time, and the blood vessels, being more enlarged, will allow the circulation to be longer carried on through them. In short in every state of the lungs, the two circumstances must be equal and reciprocal; the chemical and mechanical action will go hand in hand.

From this view of the subject it cannot be a matter of surprise, that writers should have differed as to which of these circumstances occasions death; without, therefore, adverting to all the other opinions on this subject, of which I have already treated sufficiently in another place, I shall confine myself to the consideration of two questions, the proper explanation of which will, I conceive, exhibit this intricate subject in such a point of view as may enable us to determine,

mine, with some degree of certainty, the precise circumstance to which the ultimate effect should be imputed.

The questions, by which I conceive this determination will be most clearly established, are,—Whether the suspension of the action of respiration induces a stoppage of the circulation and its necessary consequences---*chemically*, by depriving the blood of certain properties which it should acquire from the air in its passage through the pulmonary vessels—or *mechanically*, by obstructing the passage of the blood through the lungs.

The arguments that are brought to support the former, I shall endeavour to state with all the accuracy in my power.

Atmospheric air is said to be composed of phlogisticated, dephlogisticated, and fixed air, in the proportion of nearly two thirds of the first, one third of the second, and

and a very small quantity of fixed air. When this air is respired, it is found to have undergone a change in the proportion of its constituent parts, the dephlogisticated air being diminished, the fixed air increased. As these changes are constant and uniform, they must be connected with some corresponding changes in the blood that circulates through the lungs.

By repeating the experiment of Vefalius it was found that the blood in the trunks of the pulmonary artery was black, but in those of the pulmonary veins, florid; this change of colour therefore is produced by the chemical action of the air, and the dephlogisticated portion is found to be that which produces the effect.

When the dephlogisticated air is diminished, the blood passing through the lungs does not undergo the change of colour, and the symptoms which follow obstructed respiration are to be attributed

to

to this particular quality of the blood ; it having been observed that when the blood which passed into the left auricle was florid, the auricle and ventricle contracted strongly, but when the blood began to put on a shade of brown the contractions were diminished, and when it was black they ceased, although the auricle was distended with blood, and as the contractions ceased, the functions of the body were suspended ; but as soon as the florid colour began to be restored, the auricle and ventricle resumed their contractions, and all the other functions returned.

Applying these principles to animals in a state of submersion, it is said that the dephlogisticated air, which the animal has in its lungs, is gradually consumed, and consequently that the blood passing through the pulmonary vessels receives less and less of its florid colour, and the

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contractions of the heart become proportionally slower until they cease entirely, because the blood which passes into its cavities is an insufficient stimulus.

The blood in the pulmonary vein, the left sinus venosus, left auricle, ventricle, and arterial system, is therefore of a black colour, and is an insufficient stimulus for exciting the action of the parts that contain it; on account of this defect of stimulus the left sinus venosus and auricle receive it into their cavity and remain at rest. As soon as they cease to contract all the intellectual operations cease, sensation and voluntary motion are suspended, and the external signs of life disappear.

Dr. Goodwyn, aware that the conclusion may “at first appear singular,” that
the

the same black blood which is a sufficient stimulus for the *right* side of the heart, should be insufficient to excite the *left*, endeavours to obviate the objection that will naturally occur against this theory.

He observes, “that the two sides of the heart do not exactly resemble each other in all their qualities, there being a considerable difference between them, both in respect to the quantity of muscular fibre and the facility of being excited to contraction.”

The conclusion does indeed appear singular *at first*, for the reason specified; and notwithstanding what is said in its favour, I apprehend it will also appear singular *at last*.

There certainly is a considerable difference in respect to the quantity of muscular fibre in the two ventricles, and for a very evident reason,—the right ventricle has only to propel the blood through the
lungs,

lungs, whilst the left must (with a much greater force) drive it over the whole body.

That there is a difference between them in respect to the facility of being excited to contraction, I am willing to allow, under certain restrictions ; for, so far as my observations have extended, the greater facility of contraction does not depend on any peculiarity in the fibres of the right side of the heart, but on the greater degree of stimulus which is constantly in animals under the present circumstance applied to that side of the heart ; for when, by any means, the quantity of blood in the two sides has been brought to an equality, the irritability or excitability has been nearly equal ; and many instances have occurred to me where the contractions of the left side have been stronger, and continued longer, than those of the right.

It

It is also added, “that there are several examples in the animal body where muscles of a similar structure are not excited the by same or similar power; some are thrown into contraction by the will, some by particular conceptions of the mind, and some by chemical stimuli: yet none of these different powers will produce a perfect contraction of those muscles to which they are not adapted by nature.”

But this is a vague argument. The heart being a muscle of a very peculiar nature, and its offices no less remarkable, it resembles no other muscle in its contraction, or in the direction of its fibres; whilst all other muscles have some considerable affinity to each other, both with respect to the nature and direction of their fibres:---neither is there any muscle, viscus, or other part in the whole body, whose function bears any sort of resemblance

blance to the heart, or that has the same, or even a similar, power to excite it to contraction, or to the performance of its office.

These arguments therefore will, I apprehend, be deemed a very indecisive answer to the objection, that the blood which is sufficient to excite the action of one side of the heart should be sufficient to excite the action of the other.

The next circumstance deserving of notice is, that the left side of the heart *ceases to contract* as soon as the blood in its cavities becomes *black*, and that the cessation of the intellectual operations of sensation, voluntary motion, and the external signs of life, *arises from this stoppage of the motion of the left side of the heart.*

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Did the inaction of the heart depend upon this black colour, or phlogifticated state, of the pulmonary blood, it is evident that, as soon as the blood passing through the pulmonary vein has acquired in a great degree this colour, the left sinus venosus, auricle, and ventricle, would *immediately cease their action, and that this action could not be renewed* in any degree so long as the blood in those cavities continued in the *same state*, that is, so long as it was kept from the influence of fresh air.

If this therefore be the case, it is evident that when we open the chest of any animal, as soon as the usual external signs of life disappear we shall not perceive any motion in either the left auricle or ventricle.

EXPERI-

E X P E R I M E N T.

To ascertain this circumstance, I drowned an animal under a glass receiver filled with, and inverted into a vessel of, water: as soon as its strugglings ceased, and it appeared to be dead, it was removed from the water, and the heart and lungs exposed to view.

*Both auricles and both ventricles were found contracting and dilating with considerable strength and regularity: the right auricle and right ventricle contracted for thirty minutes; whereas the left auricle and left ventricle continued to contract for one hour and a quarter, after every external sign of life had disappeared.**

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* The blood in the left side of the heart was as black, immediately after the animal appeared dead, and while the contractions of the heart subsisted, as it was two or three hours after, when all motion of the heart had ceased; it cannot with any propriety
therefore

The same experiment was repeated on eleven other animals. The event of these experiments was not exactly the same :— in some the contractions continued longer, in some a shorter time ; and an instance or two occurred where no motion whatever in either side of the heart could be observed. This difference does not at all however interfere with the general event, for the average length of time, in five cases wherein the left auricle contracted after the animal appeared dead, was one hour and twenty-eight minutes ; and in the left ventricle, forty-eight minutes.*

Conceiving

therefore be said that the heart's motion ceased in consequence of the blood's having acquired a higher degree of phlogistication.

* I take this opportunity of mentioning that, on account of the difficulty, indeed the absolute impossibility,

Conceiving it possible that the air might have some effect on the external parts of the heart, so as to continue its

bility, of procuring other subjects, my experiments were chiefly made on young animals, such as kittens and puppies ; what therefore is said in this place, and indeed in every other part of this paper, is to be considered as referring to appearances observed in those animals. I have not been able to remark any difference of the least consequence in the length of time required to drown a kitten and a puppy ; nor could I observe any difference in the continuance of their convulsive motions, in the contractions of their hearts, or in the irritability of these or of any other parts of their bodies : observations therefore made on one class of these animals refer with strict propriety to the other class also. I have not yet ascertained whether the appearances between the full grown animals correspond so exactly, although I have reason to believe they do ; but I am certain there is a difference between the appearances attending the deaths of young and of old animals, and it is a circumstance that ought to be particularly adverted to.

motion longer than natural, I varied the experiments in such a manner, that it did not appear possible the air could produce any such effect.

EXPERIMENT.

With this view, after drowning the animals in the usual manner, and opening the chest, the pericardium was suffered to remain upon the heart, so that the air could not come in contact with its external surface: but the heart, in all the instances, contracted as usual.

EXPERIMENT.

More effectually to exclude the contact of the air, some animals were drowned in cold, and others in moderately warm water;

water : the thorax was then opened, and the sternum removed, while the animal remained under water ; but in every instance the heart was found contracting, and it continued to contract, some time after the animal appeared dead.

Recollecting that Dr. Priestley had related, that the colour of the blood was capable of being soon affected through a moist bladder, and having often remarked the familiar appearance which presents itself in bleeding, where the blood is changed from its usual dark brown to a bright florid colour, considerably below the surface of the coagulum, although this was covered with the serum, I thought the continuance of the contraction might, in the present instances, be attributed to some such circumstances : I

attempted therefore to find out whether the heart would contract when the animal was covered with a fluid, through which I found the air could not produce any alteration in the colour of the blood.

EXPERIMENT.

After various devices, I found that oil was extremely well calculated to answer this purpose; for, on receiving some dark venal blood, in a wide mouthed glass vessel, and immediately covering it with a very thin coat of oil, not the least alteration was perceived in the colour of the blood, although the oil was exposed several days to the influence of the air: a kitten was therefore immersed in a vessel of sweet oil, of the temperature of $67\frac{1}{2}^{\circ}$. nine minutes after immersion it was opened while it was entirely covered

covered with the oil; both auricles and both ventricles were found contracting very forcibly, fifty-one strokes in a minute, and continued to do so about three quarters of an hour, but some degree of motion was perceivable upwards of two hours after.*

From the events of these experiments we may conclude, therefore,

That the left sinus venosus, auricle, and ventricle, do not cease to contract in conse-

* The motion here alluded to was considerable, although by no means so strong as at first; but it was several hours before it ceased entirely. In looking over the notes of my experiments, I find that in some animals, both cats and dogs, that were drowned in the usual manner, and opened after their deaths, some motion was perceivable in the heart after a very considerable length of time; i. e. six, eight, ten, and twelve hours; and in one or two instances, where particular attention was paid, its motion did not entirely cease for almost twenty hours.

quence

quence of the phlogisticated state of the blood in their cavities :

That the intellectual operations do not cease—that sensation and voluntary motion are not suspended—and that the external signs of life do not disappear in consequence of the sinus and auricle ceasing to contract : for, in the generality of instances, the sinus, auricle, and ventricle, continue to contract with a considerable degree of force for some time after the blood has acquired its black colour and appears fully saturated with phlogiston, and for some time after the external signs of life have disappeared.

Dr. Goodwyn infers from this theory, that the only conditions of the body requisite for the recovery of drowned animals are, that the blood be of a florid colour

lour in the left side of the heart, and that that side of the heart retain the faculty of contraction.

Several instances are mentioned where the blood in the left auricle and ventricle was, by imitating natural respiration, very soon changed from a black to a florid colour; and many experiments which I have just related prove, that the heart has not only the faculty of contraction, but absolutely a strong and natural action commonly for a considerable length of time after the animal has appeared dead; upon this principle therefore it would be very easy to recover animals, so long at least as the heart continues to contract, without the application of any stimulus, either internal or external, other than that which usually excites its action.

I have said that the average length of time during which the left auricle continued

tinued to contract spontaneously, and with a tolerable degree of force, in five instances, was nearly one hour and a half; consequently, if the colour of the blood is changed at any time within that period, which may, according to Dr. Goodwyn, readily be done, the animal ought to recover: but will any man venture to say he can recover an animal whose respiration has been suspended one quarter of that time?*

We

* The hearts of many animals continue the capacity of contracting, if kept in a mild atmosphere, even so long as twenty-four hours, after the appearance of death has taken place, upon the application of various stimuli to their external surface, such as gentle pressure, pricking with a knife, a drop of any of the mineral acids, the caustic alkali, an hot iron; and sometimes much longer by means of an electrical

We are told that the pulmonary veins, sinus venosus, left auricle, left ventricle, and the trunks and smaller branches of the arteries proceeding from the left ventricle, contain a quantity of this black blood, which is said to be an *insufficient stimulus* to excite the contraction of the heart: it is not allowed that this blood is possessed of any noxious power, because “if it diminished or destroyed the faculty of contraction, the heart would not contract again when those means are applied which are necessary to produce the contractions:”—no experiments however are offered in support of this position, and the reason has not even plausibility to recommend it, for surely no one

electrical shock: so that I am not sure, if we adopt this theory, whether we must not give credit to those extraordinary instances of recovery which have long been deemed fabulous.

can

can deny but the faculty of contraction may be materially diminished, and yet it may contract again “when those means are applied which are necessary to produce the contraction;” for any thing that appears to the contrary, therefore, the blood may just as readily exert a *noxious* or *sedative* power as be an *insufficient stimulus*.

In which ever point of view this affair of black blood is regarded, it should seem that all the parts of the body in which this blood is present are equally liable to languish under the same defect—the brain, the source and origin of all the senses—the chylopoetic and abdominal viscera—the muscular system, &c. in short, the animal and natural functions must cease, as well as the vital, for want of the salutary action of the florid blood; and how is it possible that all these organs
can

can again acquire their power of action, by altering the property of the blood in the pulmonary artery, and perhaps likewise in the pulmonary veins?

But supposing for one moment, and for argument's sake, what is very difficult to conceive, that this alteration does take place; yet it must be evident to every one, at first sight, that it is impossible the change can take place till inflation of the lungs has produced it: now, of the great number of recoveries mentioned in the reports of the Humane Society, how very few are the cases where artificial respiration was used at all; and many instances must have been seen, by every one used to make experiments of this kind on animals, that they often recover without any assistance whatever:—how the blood in the lungs, heart, brain, &c. has in these cases undergone
the

the necessary change I am unable to comprehend !

The author of this theory says, “no one can deny that the respiration is sometimes established in this state, in consequence of the application of heat :” but if the cause of the animal’s state of apparent death is, as we are taught to believe, black or phlogisticated blood in the left side of the heart, what effect can *heat*, or any thing else, air excepted, have in changing its property ? A proper degree of heat may encrease the irritability of the fibres, and by such means the disposition for action in the fibres of the heart will be encreased, but nothing further : action itself cannot take place till the blood has received its stimulating property, and till its colour is altered ; which changes cannot take place without the repeated application of fresh air.

Mr.

Mr. Hunter, in his paper on the recovery of persons apparently drowned, published several years since, notices a theory very similar to that adopted by Dr. Goodwyn; he says, “the loss of life in drowned persons has been accounted for, by supposing that the blood rendered unfit, by want of the action of the air in respiration, is sent in that vitiated state to the brain and other vital parts, by which means the nerves lose their effect on the heart, and the heart in consequence its motion:” this however, he continues, “I am fully convinced is false; first from the experiments on the dog, in whose case a larger column of bad blood, viz. all that was contained in the heart and pulmonary veins, was pushed forward without any ill effect being produced (Animal Oeconomy, page 118); and next, from the recovery of drowned

D

persons

persons and still-born children, which under such circumstances never could happen unless a change of the blood could take place in the brain prior to the restoration of the heart's motion: therefore the heart's motion must depend immediately upon the application of such air to the lungs, and not upon the effects which air has upon the blood, and which the blood has upon the vital parts."

As this objection was opposed to a theory so very similar to that which is the subject of our present disquisition, several years I apprehend before Dr. Goodwyn attended to the subject, and by a person of the very first eminence and authority in our profession, it was natural to conclude that Dr. Goodwyn would, at least the second time of publishing his book, pay particular attention to an
objection

objection that materially concerned his theory.

But if any notice whatever is taken of it, it is so very distantly and obscurely as scarcely to be perceivable; and as neither arguments nor experiments are brought against this objection, it seemingly was found altogether unanswerable.

It is said that the disease under consideration is in the blood, and consists in the presence of this black blood in the left side of the heart and arterial system; and the subsequent appearances, such as the diminution of the action of the heart and arteries, &c. are the consequent symptoms.

Whatever share the state of the blood may have in causing death, it does not appear by any means certain that it is

owing so entirely to its black colour as this and many other passages in the Doctor's performance would lead us to conclude, since cases do not unfrequently occur, where, in dissection, black blood has been found in the left side of the heart and arterial system, notwithstanding the person suffered a very different kind of death, and where lividness of the lips, face, and other parts of the body, to a considerable degree, was found in patients under circumstances seemingly not any way connected with a state of suspended respiration.

In proof of the former part of this assertion I might here relate many instances which have occurred to my own observation; but such instances are so generally known, and so many are to be found in almost every book of anatomical collections, that I will only refer to those
related

related by Morgagni, of persons dying in consequence of *apoplexy* (which apoplexy was evidently induced either by extravasation or great distention), where the face, lips, and neck, were of a *blue* or *livid colour*, and where on dissection the blood in the different cavities of the heart was *black*.

I lately had two cases under my care, and every man of moderate practice must have seen others, where the patients being suddenly and unexpectedly attacked with violent apoplexies, an hour or two before death the face and neck became very livid, and just before that event took place almost entirely black : in these cases the respiration was, as it always is under similar circumstances, long and laborious ; but there was no obstruction to the passage of the air into and out of the lungs ; and as, probably, there was ten times the quantity of air taken into and expelled from the lungs than would

be in common respiration, the blood passing through the pulmonary vessels must have been exposed to the influence of a greater quantity of air than when the person was in health.

I am acquainted with a young lady of a healthy, but very delicate constitution, subject to no complaint but what occasionally arises from a weak stomach, who observed, the beginning of the winter before last, that she was more than usually affected by the cold; as the winter advanced the inconvenience increased; and it was soon observed, that when she exposed herself to any moderate degree of cold, either in the house or whilst in exercise in the open air, for a very few minutes, it had a visible effect on the colour of her face; the cheeks and nose became red, the redness would increase, and, if she continued exposed any considerable

derable length of time, it became quite of a blue colour. The intensity of the colour began to abate as soon as she became in the least warm, and when she was sufficiently so, it entirely disappeared, and her complexion recovered its usual appearance. From that time to the present she suffers the same inconvenience whenever she exposes herself to the cold, and it goes off as soon as she becomes warm: it is for obvious reasons more frequent in winter; but if in the summer-time she finds it at all cool, the same appearance readily takes place.

This lady was about twenty years old when this occasional change of colour was first observed, and it came on without any assignable reason whatever. Her state of health, particularly as to respiration, does not vary either before, at the time of its appearance, or after it has subsided; and

the only inconvenience she perceives, is from the sensation of cold, and a kind of pricking in the parts affected.

Can the black colour of this blood be occasioned by the want of the action of the air in respiration? If it can, I would gladly know in what manner its action is impeded.

Dr. Crawford has observed, in his elaborate treatise on animal heat, that the venal blood of animals, which has been kept for some time in a warm medium, approaches in its colour very nearly to that of arterial blood; and that the arterial blood of animals kept in a cold medium, becomes darker than usual. I have been informed that Dr. Crawford confined an animal in a cold medium at about 28° , and allowed him to inspire but a small quantity of air; arterial blood drawn from this animal, although he was perfectly alive and well, was equally dark coloured

coloured as the blood found in the left side of the heart of an animal that was drowned; so that the same coloured blood killed one animal, although it suffered another of the same species to live very well.

From these cases and experiments it is evident,

1. That in the instances mentioned, and in many similar to them, the black colour of the blood must depend on some other circumstance beside the want of the action of the air. And,

2. That the black blood *does* possess a sufficiently stimulating quality to excite the action of all parts of the heart.

From

From what has been said, therefore, it appears,

1. That the left auricle and ventricle do not cease to contract *in consequence* of the black colour or phlogisticated state of the blood in their cavities; because they really do contract, and with a considerable degree of force, for some time after the blood has acquired its black colour.

2. That the intellectual operations *do not cease*; that sensation and voluntary motion *are not suspended*; and that the external signs of life *do not disappear in consequence* of the sinus and auricle ceasing to contract because the sinus and auricle continue to contract a considerable time after those changes have taken place.

3. That

3. That it does not appear that the blood's being restored to a florid colour in the left side of the heart, and that side's retaining the faculty of contraction, are the only conditions requisite for the recovery of drowned animals; because animals do not in many instances recover when this colour of the blood is restored, although the contraction of the heart continues.

4. If the black colour, or phlogisticated state of the arterial blood, is the cause of the death of drowned animals, it may just as readily exert a sedative effect, as be an insufficient stimulus; under either circumstance, all the different viscera in which this blood is present, appear liable to be affected by want of the salutary action of the florid blood as much as the
left

left auricle and ventricle ; and it does not appear, when their various functions are in this manner once suspended, how they can be removed by altering the property of the blood in the pulmonary artery and pulmonary vein.

5. If the death of drowned animals be occasioned by the black blood in the left auricle and ventricle, it would be impossible that any animal should recover till the property of the blood is changed by inflating the lungs ; the contrary of which is very generally known.

6. It does not appear that the death of drowned animals is occasioned by “ black blood in the left side of the heart and
arterial

arterial system," because many instances have occurred where the same appearances have been observed in persons who have suffered a very different kind of death : where, in diseases, the blood has appeared to possess an equal degree of blackness, accompanied with strong action of the heart and arteries, and deep regular and uninterrupted respiration : and where in a state of health, the vital, natural, and animal functions have been continued, notwithstanding there was a considerable alteration in the colour of the blood.

From the whole of these observations I draw the following conclusion.

That

That the suspension of the action of respiration does not induce a stoppage of the circulation and its necessary consequences, by chemically depriving the blood of certain properties which it should acquire from the air in its passage through the lungs.

We

We now proceed to inquire, Whether the suspension of respiration induces a stoppage of the circulation and its necessary consequences, by mechanically obstructing the passage of the blood through the lungs.

EXPERIMENT.

I find, by repeated experiments, that a person in health, and in a state of perfect rest, usually respire about seventeen cubic inches of air ; but, at the end of the expiration, there still continues in the lungs eighty-seven cubic inches ; and at the end of each inspiration, the lungs are capable of containing near two hundred additional

additional inches. So that we may reckon, upon an average, that a moderate sized person can take into, and expel from his lungs, three hundred cubic inches of air; the volume of the lungs, therefore must be very materially different at the time of a full inspiration from what it is at the time of complete expiration.

It is very well known, and I believe universally understood, that the capacity of the pulmonary blood-vessels must be diminished or enlarged in equal and exact proportion as the volume of the air-vessels is diminished or enlarged: consequently, at the time of complete inspiration, the capacity of the pulmonary artery and vein will be enlarged to the utmost extent, so that the blood will circulate

culate with some degree of readiness through them ; and, at the time of complete expiration, their extremities in particular will be so much contracted as almost entirely to prevent the passage of any blood through them.

In support of this, I beg leave to mention the following experiments.

EXPERIMENT.

A terrier puppy, about a week old, was placed under the receiver of the air pump, and the air directly exhausted. Notwithstanding the receiver was tolerably capacious, the animal's strugglings ceased in exactly two minutes from the time the machine began to be worked.

E

After

After twenty minutes the air was let into the receiver, the chest was opened, and the heart and lungs exposed to view. The right side of the heart and veins were enormously distended with blood; the left side was almost empty.

EXPERIMENT.

A puppy of the same litter was placed under a glass magazine of a condensing machine, and as much air forced into it as could be done by means of a common hand condenser. The restlessness of the animal prevented my observing by the gage to what degree the air was condensed; but by subsequent operations I have reason to believe, though I cannot be certain, that between three and four atmospheres were forced into the magazine; notwithstanding this great degree of condensation,

denfation, the animal remained in his confinement a quarter of an hour at a time without any material inconvenience. When the fuper-abundant air was let out, the fudden change feemed to have a momentary effect upon him, but in a few feconds he was as well as ever.

In the first experiment the air was fo much rarefied, that the diaphragm, intercoftal mufcles, and all the other mufcles concerned in the action of *infpiration*, were infufficient to counteract the expanfile property of the air; for the ufual equilibrium between the external, air, and the air circulating in the fluids in a difsolved or fixed ftate, was deftroyed; the confequence of this muft be, that as the preffure of the external air was diminifhed the fixed air of the fluids began to expand,

and when the former was materially removed, the latter became detached and extricated from the mass of fluids in equal proportion ; hence the air in the vesicles of the lungs being exceedingly rarefied, the internal air must become expanded, the muscles concerned in *inspiration* could not act with sufficient force to overcome these causes, the lungs were therefore necessarily forced into a state of complete expiration, and but a small quantity of blood passed to the left auricle of the heart.

In the second experiment the external air acted with a very considerably increased force upon every part of the body that it could come in contact with ; these were the surface of the body and the cavity of the lungs : upon the surface of the body this additional pressure could effect no particular alteration ; but the

the condensation of the air being very considerable, the muscles of *expiration* were not sufficiently strong to expel more than a small quantity of air from the lungs, consequently the lungs would be continued in a state nearly approaching to that of complete inspiration; under which circumstances this experiment proves that the blood passes with sufficient readiness through the pulmonary vessels.

To corroborate these experiments I endeavoured to produce a state of complete inspiration, and likewise a state of complete expiration, in the following manner.

E X P E R I M E N T.

A proper pipe being affixed to an hand air-pump, was introduced into the trachea of a kitten, and the air immediately exhausted from the lungs; the exhaustion was continued until the animal ceased to struggle, which was fifty seconds.

This experiment was repeated on another kitten with this difference, that as soon as the air was exhausted the trachea was immediately tied, the struggles ceased as in the last exactly in fifty seconds; in both cases but a small quantity of blood was found in the left auricle.

E X P E R I M E N T.

A proper pipe was inserted into an opening made in the trachea of a kitten
about

about a month old, and air was, by means of a common pair of bellows and flexible tube, continually forced into the lungs, so as to keep them as constantly as possible distended; the operation was continued one hour, at the end of which the animal did not appear any ways affected; the pipe was therefore removed, and he immediately appeared as lively as ever.

EXPERIMENT.

A proper pipe was fixed to a strong bladder, which was filled with atmospheric air; the pipe was inserted into an opening made in the trachea of a kitten about three weeks old, and properly secured there; a very strong and uniform pressure was then made on the bladder, so as to keep the lungs constantly and regularly distended: in this state the

animal continued strongly alive eight minutes, its strength then failed, and in four minutes more it lost all the usual signs of life; a ligature was then made on the trachea so as to continue the lungs in a state of distention, and the pipe was withdrawn. It was opened; the motion of every part of the heart was uncommonly quick and strong, by far more so than I had ever observed in any animal killed in any other manner; and some of the smaller arteries which were divided bled per saltim. There did not appear by any means that distention of the cava, or of the right auricle or sinus, which is usual in animals that are drowned, or when the air is exhausted from their lungs. On opening the left auricle a larger quantity of blood was evacuated than I had ever observed before.

To

To perform this experiment with accuracy considerable attention is requisite, or it will not always succeed; it was repeated several times, and at one in particular every precaution was taken against all interfering accidents. The subject was a kitten of the same age and litter as that just mentioned. After introducing the pipe into the trachea, a very, strong, regular and uniform pressure was made on the bladder; the pressure was so hard that I with difficulty could continue it fifteen minutes, my arms were then so tired I was obliged to remove the pipe; the animal directly turned itself about, respiration immediately commenced, and in a few minutes it perfectly recovered.

EXPERIMENT.

The pipe was introduced into an opening made in the trachea of another animal;

mal; as soon as the lungs were fully distended, a ligature was made on the trachea, and the pipe withdrawn. In two minutes and ten seconds the struggles ceased; in fifteen more it was opened, and the right auricle was found to contain a somewhat smaller quantity of blood than the left. This experiment was repeated on an animal of exactly the same age, and the struggling continued two minutes and forty seconds.

From these experiments it is evident,

That only a very small quantity of blood can pass through the lungs when they are in a state of perfect expiration.

That the impediment to the passage of the blood through the lungs is materially lessened by their being in a state of full inspiration. And

That

That the difference in the length of time which an animal will live with colapsed and distended lungs, is in the proportion of fifty to the former, and one hundred and thirty to the latter.

If the capacity of the pulmonary blood vessels be enlarged to the utmost when the cells of the trachea are fully distended, it may be doubted what purpose the alternate motion of the lungs can answer, as in expiration the capacity is so much diminished: to this it may be replied, that, independent of its being the most commodious method of bringing the air in contact with the blood that has served its offices in the constitution, and thus producing a continual supply of fresh heat, it is extremely probable that the motion of the lungs is necessary to promote the
circu-

circulation through them ; for the quantity of blood that is to pass through the lungs is enormously great, equal to that which passes through the whole arterial system in the same space of time, the impediment to its free circulation through the minute ramifications must therefore be considerable, even when the capacity of the vessels is tolerably enlarged ; hence arises the necessity of expiration, which, by reducing the capacity of the vessels, presses the blood through the capillaries, and very much accelerates its passage into the left sinus and auricle.

The idea is rendered more probable by observing that the degree of motion of the lungs is always in proportion to the quantity of blood circulating through them ; for instance, when in a state of perfect rest, a person in health usually
occasionally

occasions but a small alteration in the volume of the lungs, for he then respire about seventeen cubic inches: motion of the body quickens the circulation: the exertion of certain passions produces the same effect; and we all know by experience, that the motion of the lungs is increased likewise: if either one or the other is continued, or materially increased, the respiration is increased in proportion; and if the exertions are violent, we are then compelled to produce the greatest motion in the lungs, by inspiring as much air as they will contain.

The event of the following experiments seems also very much to corroborate this opinion.

EXPERI-

E X P E R I M E N T.

I made a full inspiration, and took three hundred cubic inches of air into my lungs; I retained it there as long as I was able, which was seventy-two seconds. On examining this air by the test of nitrous air, I found it 31,00 worse than when I inspired it.

E X P E R I M E N T.

I inspired the same quantity of fresh atmospheric air, and by means of a proper contrivance breathed it into and out of a bladder as long as I could, which was one hundred and thirty seconds; on examining it in the same manner, it was 48,00 worse than when inspired.

A certain

A certain quantity of air, therefore, when the lungs are in motion, will continue the circulation of the blood through them almost twice as long as the same quantity will when they continue uniformly distended; the uneasiness and anxiety is the same in both experiments notwithstanding the air which is breathed longest is 17,00 worse than the other.

Having premised these observations, it will now be necessary to enquire in what state and in what degree of distention the trachea of those animals is found that are killed by drowning.

The distention of the trachea, and its ramifications, may be occasioned by one of two circumstances; by water inspired into the trachea, or by air remaining in it.

If

If water is inspired into the trachea, the coloured fluid in which the animal was drowned, will of course be found in it.

The general event of my experiments on this head I have before mentioned, and declared that very *little*, if *any*, occurred to my observation, if the examination was made soon after the animal appeared dead.

If air remains in the cells of the windpipe, the quantity may be nearly ascertained, by pressing the chest of the animal while its head is placed under a receiver filled with, and inverted into a vessel of, water.

EXPERIMENT.

After an animal was drowned in the usual manner, it was gently removed
from,

from the receiver in which it had been drowned, and its head placed under another receiver exactly filled with water; in this situation its chest was repeatedly pressed, but not one particle of air escaped from the mouth.

EXPERIMENT.

In order to compress the lungs as effectually as possible, after drowning other animals, and placing them in the same situation as in the last experiment, the sternum was removed, the lungs were consequently surrounded with water; but, notwithstanding there was the pressure of fifteen inches of water on their surface, not the smallest portion of air was expelled into the receiver.

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From

From hence we conclude,

That the lungs of drowned animals are in a state of perfect and complete expiration : and, consequently,

That only a small quantity of blood can pass to the left sinus and auricle.

If the stoppage of the circulation first takes place in the pulmonary artery, it follows that the blood returning from the various parts of the body, should, in consequence thereof, be accumulated in the right ventricle and auricle, in the sinus venosus, and in the great veins immediately connected with them. But is this found to be the case ?

I speak with moderation when I say, that the number of experiments which I have made on various drowned animals, principally to elucidate the nature of their deaths, has amounted to two hundred ;

hundred; and out of this number I can with truth assert, that not one instance occurred in which the *venæ cavæ*, right sinus, and auricle, were not excessively and enormously distended with blood; but the accumulation did not at all times appear so considerable in the right ventricle,*

F 2 although

* Why the right ventricle is not so much distended as the right auricle, may be readily explained. The contraction of this ventricle, as I may shew in another place, continues longer than in any other part of the heart; its substance is likewise much stronger than that of the auricle, sinus, and great veins: hence no sooner is blood thrown into it from the auricle than it immediately contracts; the contraction is so considerable that some blood is propelled through the lungs, and what remains in the cavity keeps up so constant an irritation that the further entrance of fresh blood is prevented.

If an animal is opened as soon as it appears drowned and a ligature passed round the pulmonary artery, the distention will be somewhat more considerable; but

although the pulmonary artery was always very much dilated and filled with blood.

We have now traced the consequences of the suspension of respiration to the mechanical congestion of blood in the right side of the heart and lungs, it only

but while the power of contraction and the irritability are greater than in the parts connected with it, the full effect cannot take place.

Whoever has employed much time in making experiments of this kind, must have remarked, that although the contraction and irritability of the different parts of the heart observe a general rule, yet that particular exceptions now and then occur; when, therefore, an instance is observed where the pulmonary artery has been taken up, that the right ventricle loses its power of contraction some time before the auricle, there the distention is equal in every part of the right side of the heart.

remains

remains to offer some few remarks as to the manner in which this congestion may occasion death.

It cannot be expected that we shall be able to ascertain this point exactly by dissection; we have hitherto been conducted entirely by it; the subject now, however, becomes too minute to rely altogether upon this mode of investigation, and we are compelled to call in other aid.

As the congestion must produce its final effect either on the heart, the lungs, or the brain, we will examine upon which of these vital organs it is most likely to act.

We are naturally led, in the first place, to enquire whether it may not exert its fatal effects immediately upon the heart itself.

If it operate immediately upon the heart itself, the action of the heart, more especially of the affected side, must cease as soon as the distention is formed.

I have already had occasion to observe that this is by no means the case, for the heart in every instance continues to pulsate, and with a very considerable degree of force, sometimes upwards of an hour after the appearances of death have taken place; and the right side, which should be most immediately affected, almost always continues its action the longest, commonly at least three times as long as the left side; how, therefore, it is possible that this congestion should operate on the heart so as to induce the appearance of death in every other part of the body, and yet continue perfectly alive itself, is very much beyond my comprehension.

Can

Can it produce this effect by acting upon the lungs?

The lungs are perfectly passive in respiration, and are destitute of sensation; they moreover do not appear to be further concerned in the vitality of the system, than as they facilitate the action of the air on the blood and blood-vessels: to effect this as completely as they do, it is necessary they should have a regular and constant motion, which, while it promotes as much as possible the action of the air on the blood is admirably calculated to propel the blood through the pulmonary vessels; a circumstance that would not be readily effected without some such contrivance, on account of the vast quantity of blood that is to pass through so small a space.

When this motion then is interrupted, an impediment arises to the action of the air on the blood; and the blood is arrested

in its passage from one side of the heart to the other.

We see, therefore, that although the stoppage of the action of the lungs necessarily causes death, yet that it must effect it by the medium of some other vital organ, instead of producing it immediately by itself.

If the congestion does not produce its final effect on the heart or lungs, it follows that the brain is the organ it must operate upon.

But it may not be improper to enquire, whether there be any, and what proof, of the reality of this circumstance.

We will, therefore, first make ourselves acquainted with the external appearance of the body, and the state of the brain, as it appears on dissection; next trace the consequences that reason teaches us must ensue from the congestion
in

in the great veins; and we will then observe in what manner it is likely the brain should in consequence be affected.

“ The face is remarkably swelled; the eyes violently suffused with blood, enlarged, prominent, and sometimes so protuberating that the eye-lids seemed insufficient to cover them; the features of the countenance are generally distorted; and the tongue, in part, thrust out of the mouth.”

Extravasation does not, in healthy animals, take place in any part of the brain; but there is a considerable fulness or distention of the veins of every part of that organ. The heads of various animals were examined likewise by several friends, at my request, and a certain degree of fulness, I was informed, always occurred.

The pulmonary artery, right ventricle and auricle, and the venæ cavæ, are
distended

distended with blood ; in consequence of this an accumulation of blood will take place throughout the whole venal system ; but the accumulation will be more considerable in the veins of the brain than in any other part, on account of the greater quantity of blood sent to it, and the weaker contexture of its vessels, which will more readily allow their capacity to be enlarged.

When any material addition is made to the bulk of the brain, symptoms of what is commonly called compression must necessarily take place, on account of the close connection between it and the cranium, for the bones of the cranium, cannot relax ; the pulpy substance of the brain must therefore be compressed, or forced into a smaller compass ; every one is acquainted with the symptoms that must in consequence ensue ; and every
one

one knows, when they are violent, how speedily they will occasion death.

From the external appearances of the body, from the state of the brain as it appears on dissection, and from the consequences that must ensue from the congestion of the great veins, it is evident that the brain must be in a state of compression ; and, from the manner we know the brain to be affected by compression, we may conclude, *that those who die by drowning, die in consequence of an apoplexy, or a compression of the brain**. That

* Should any further proof of the reality of this circumstance be required, I beg leave to refer to an Essay on the Recovery of the Apparently Dead, p. 37—58, where the subject is treated at some length and where the symptoms attending persons in the act of drowning, and in their recovery from that state, are particularly noticed ; and, likewise, the symptoms in other situations, such as in hanging, in the inflammatory angina, in the actions of laughing, straining, coughing, &c. all which arise from a greater or
less

That the suspended action of respiration is the first and original cause, will admit of no doubt; and it is equally evilefs interruption of respiration, and which consequently produce similar, although sometimes less dangerous effects.

Whoever has any difficulty in conceiving that the pressure on the brain is sufficient to occasion death so suddenly as is here represented, will do well to recollect the numerous instances of apoplexy which have so frequently terminated in sudden and almost instant death, with which the books of Pathologists are crowded; where, after opening the body, no other cause is to be discovered except a distended state of the vessels of the brain.

It may not be improper here to remark also, that very many instances may be recollected where the constitution will permit the greatest changes, provided they be gradually applied; but if too suddenly, the event is frequently very different.

dent,

dent, from what has been said concerning the appearances on dissection, that the right side of the heart and venal system are very much distended with blood; it is clear also, from dissection and the general collection of observations, that the distended state of the vessels of the brain is the immediate cause of the animal's losing the usual character and appearances of life.

From all this it is extremely plain that our first, principal, and great intention, should be—to remove the compression of the brain, and the distention of the right auricle and ventricle, and of the great veins connected with them. How is this to be affected?

We have seen that the impediment to the passage of the blood from the right side of the heart to the left is owing to the diminished capacity of the pulmonary blood vessels; if, therefore, these vessels
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are put in the same condition as when the blood usually circulates through them in a state of health, this impediment will be removed.

We have already observed, that when the pulmonary vessels are extended to the utmost, their capacity is not sufficiently large to allow the circulation to be carried on through them, even in a state of health; but that their alternate contraction and expansion is necessary to effect it: this action must therefore now be put in execution, and we must imitate the manner which nature compels us to act in, when from any particular circumstance we retain our breath, so that a larger quantity of blood than usual is collected in the right side of the heart; we are then obliged to make several deep inspirations and expirations, in order to propel the blood into the left side of the heart.

The

The lungs, therefore, being fully inflated, all the branches of the pulmonary artery will be immediately filled and dilated with blood by the contractions of the right ventricle, which we have seen usually continues a considerable length of time, and with a force seemingly sufficient to carry on the pulmonary circulation when no obstruction to the passage of the blood exists; some of this passes into the corresponding veins and left sinus, but the contraction of the ventricle not being so strong as in health, and the blood hesitating in its passage through the minute ramifications, some additional power becomes requisite to accelerate its circulation.

If the air is now forced out of the lungs by compressing the chest, or by any other means, this intention will be accomplished; for the volume of the lungs, will

will be diminished, and the blood in the pulmonary artery and veins will, by inevitable consequence, be driven into the left sinus, and auricle; for it is well known that it cannot return into the right ventricle, on account of the action of the semilunar valves.

When the lungs are again inflated, the pulmonary vessels will, as before, be immediately filled and distended from the right ventricle, for the blood cannot return from the left sinus, as it is prevented by the valves; some of this will likewise readily pass into the left auricle, and the remainder will, by imitating expiration, be urged forward in the same direction also.

By frequently repeating this operation therefore, the distention of the right auricle and ventricle, and of the great veins connected with them, will be removed,
and

and the compression of the brain, which depended upon this distention, will be overcome also.

It is incumbent upon us in this place to enquire, whether bleeding can have any effect in removing the compression of the brain, and the congestion in the right side of the heart and venal system.

If an opening is made in any of the veins of the arm, the greater part of the blood in the veins below the orifice may, by rubbing the extremity, be evacuated; very little, however, can be procured, because the left side of the heart and arterial system being almost destitute of blood, a fresh supply is intercepted: indeed, could any quantity be procured, it would do no good, although it might do harm, by lessening the quantity in the

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left

left side of the heart and its appendages, without lessening that in the right side and great veins, as the valves will effectually prevent the retrograde motion of the blood in the veins.

We cannot procure blood from the right auricle or ventricle, the pulmonary artery or *venæ cavæ*, by making an immediate opening into either of them ; nor is it possible, by opening a vein in any accessible part of the body, to diminish in the least the quantity of blood in any of those cavities, and for the same reason that it could not be done by bleeding in the arm, the action of the valves preventing the blood's passing in a direction contrary to its natural course. It is therefore impossible to effect any diminution of the quantity of the blood in the right side of the heart by bleeding :—we will now enquire, whether, by that operation,
we

we can in any measure remove the compression of the brain, which, as we have seen, is the immediate cause of the animal's losing the usual signs of life.

To ascertain this point, it will be necessary to consider the manner in which the blood returns from the brain and its membranes.

The blood sent to the brain returns from thence more particularly by the internal jugular veins, which are continuations of the lateral sinuses; soon after they get out of the cranium they run along the vertebræ of the neck, and pass behind the sterno-mastoidæi, and omo-hyoidæi, and end in the subclavian veins. The internal jugular veins, therefore, are too deep to attempt the drawing off blood from them.

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But

But although the internal jugular veins are the principal conductors of the blood from the inside of the head, yet the blood is in part conveyed from the brain itself into the external jugulars by the orbitary sinuses, which communicate with the *venæ angulares, frontales, nasales, &c.* The posterior external jugulars receive veins which come out of the cranium by the posterior mastoide hole from the lateral sinuses; they also receive the occipital veins which have further communication with the lateral sinuses, and under the angles of the lower jaw the posterior and anterior external jugular veins communicate. But independent of, and beside these, there are a great variety of communications between the internal and external jugular veins themselves.

It

It cannot admit of the smallest doubt, therefore, but that by drawing off blood from the external jugular vein, we shall diminish the quantity of blood in the brain; and, as the compression of the brain, and its consequences the loss of the appearances of life, depend upon that superabundant quantity, it will be advisable in all cases, but particularly in those when the external appearances of distention are violent, to have immediate recourse to that operation.

It is evident, from what has been said respecting the operation of artificial respiration, that it has the most powerful effect in removing the congestion about the heart and lungs, and consequently the compression of the brain likewise; on this account bleeding may be thought unnecessary, but, as it will materially expedite the removal of the compression,

I am of opinion it ought by all means to be employed.

As soon as the blood is thus conveyed into the left sinus and auricle, it is thrown into the left ventricle, and is from thence propelled into the aorta, its large branches, and small ramifications; the vessels having, however, in a good measure lost their irritability, or power of contraction, which is universally allowed to be the principal cause of promoting the circulation through the smaller order of vessels, an obstruction will begin to take place, and the further progress of the blood into the corresponding veins will be prevented. How is this obstruction to be overcome?

The only method of supplying the defect of the vibratory motion of the small vessels,

vessels, will be by alternately compressing and dilating them; and in this manner their contained blood must of necessity be driven towards the heart, as the valves will prevent its retrograde motion. Hence we see the great advantage that is to be obtained from the proper application of frictions, more particularly when they are applied to the extremities.

When the blood is in this way, with some degree of equality, distributed through the vascular system, we have an opportunity of paying more attention to the support and increase of the heat remaining in the body, which we know, from a variety of circumstances, is very intimately connected with the healthy state of the system, and which, therefore, at this time demands our assistance.

It does not appear, however, that the constitution at this time, I mean when all the functions are either entirely suspended, or very much diminished, requires any great degree of heat for its support; on the contrary, it appears from many observations, and particularly from Mr. Hunter's experiments, "that the degree of external heat should bear a proportion to the quantity of life," that "warmth causes a greater exertion of the living powers than cold; and that an animal in a weakly state may be obliged to exert a quantity of the action of life sufficient to destroy the powers themselves."

I am further confirmed in this opinion from the event of the following experiments.

EXPERI-

E X P E R I M E N T.

An animal was drowned, and the temperature of its body reduced as soon as possible two or three degrees below the temperature of the air, which was sixty-one degrees, by allowing it to remain in the water: small electrical shocks were now passed through the extremities, of such a degree of strength as was merely sufficient to excite a contraction; the animal was then plunged into water three degrees warmer than the muscles of its thigh, and the heat of the water was increased three degrees every five minutes, till it became of the healthy standard; notwithstanding the heat was so gradually applied, the power of contraction in the muscles diminished at every observation so much, that it was necessary
to

to increase the strength of the shock every time ; but some time before the body had acquired the natural standard, the irritability of the muscles was entirely destroyed.

The experiment was repeated with this difference : the heat of the body was reduced in one instance to seventy degrees, in another to eighty, the animals being kept in the water twenty minutes ; the degree of irritability was then accurately ascertained, and the heat of the bodies increased in the same gradual manner as before ; but in neither instance, nor in any experiments I afterwards made, did the powers of life increase ; on the contrary they evidently diminished, and, as far as I could judge, equally as fast as when no artificial heat was applied.

In

In whatever point of view this subject is observed, it is evident that the external heat should be applied in the most gradual manner; and even when this is done with every precaution, it will be highly advisable to continue the body at a moderate degree of heat, and never attempt any degree equal to the natural temperature, until the symptoms of life are sufficiently strong to bear so great an exertion.

While I am treating upon this part of the subject, I cannot avoid noticing some directions that have lately been given concerning it, which I should not think it advisable to follow; and I the more readily do it, as they are delivered by a gentleman for whose abilities I entertain a great respect, and to whose opinion the world will ever be inclined to pay much attention.

Dr.

Dr. Goodwyn, in his book “on the connexion of life with respiration,” speaking of the application of heat, after some judicious observations, says it should be applied very gradually and uniformly, and it may be raised to ninety-eight degrees, but not further than one hundred.

“When the body is warmed uniformly, and the heat of the interior part about ninety-eight degrees, we direct our attention to the state of the thorax; and, if the patient makes no attempt to inspire, we proceed to inflate the lungs with air.”

It is to me a matter of extreme astonishment, that we are here directed to wait till the body is uniformly warm, and the heat of the interior parts about ninety-eight degrees, before we turn our attention to the state of the thorax, and
proceed

proceed to inflate the lungs. The enormous length of time necessary to give a body, that has in winter fallen into the water, and for a considerable time been exposed to the cold bleak air, an uniform and natural degree of heat, will readily be conceived by those who have seen persons in similar situations; and by them it will naturally be supposed, that by the time the body has acquired this degree of artificial heat, the vital principle, unaided by the smallest degree of circulation, will be too far extinguished for any future recovery. I must approve the directions for conducting the application of heat, because precautions nearly similar to mine are recommended, and for similar reasons; but where so much dependance is placed on the immediate application of heat, and where so great a quantity is directed, I fear its application
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will be made too suddenly, and thereby destroy the small remains of vitality, or at least materially impede its further increase.

No reason is given by Dr. Goodwyn, nor do I conceive any good reason can be given, why we are to wait till the body is thoroughly warmed before we inflate the lungs; for from any thing that appears to the contrary, the blood may, according to his theory, be as readily changed at one period of the treatment as at another. In every case of suspended animation, therefore, I should, on every account, have recourse to artificial respiration; as soon, at least, as I had placed the body in the best situation for the application of external heat.

No one, I believe, at this time doubts that the constant supply of animal heat is occasioned by the action of the air on
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the blood in respiration : this is rendered sufficiently evident by the very accurate and elaborate experiments of Dr. Crawford ; and from the manner in which that gentleman explains the generation of animal heat, we have reason to apprehend, that the circumstance of artificial respiration is one of the most powerful and effectual means we can employ for producing heat in the body at this time ; and this it will be likely to do in proportion to the remaining degree of life. “ The pure air,” says Dr. Crawford, “ is received into the lungs containing a great quantity of elementary fire ; the blood is returned from the extremities impregnated with the inflammable principle ; the attraction of pure air to the latter principle is greater than that of the blood. This principle will, therefore, leave, the blood to combine with the air ; by this combina-

combination the air is obliged to deposit a part of its elementary fire, and as the capacity of the blood is at the same moment increased, it will instantly absorb that portion of fire which has been detached from the air." Now there is every reason to think that the blood in the lungs of drowned animals is very fully impregnated with the inflammable principle, and consequently, if there be any degree of vitality remaining in the system, the repeated application of fresh air to the lungs will be likely to produce effects similar to, although in a smaller degree than in those who have a greater degree of life.

In confirmation of this idea, it suits my purpose to observe, that I once attended a person who had been some considerable time in the water, and was a still greater length of time exposed in his wet clothes

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to the action of the air. When removed on shore there was no opportunity in the house to which he was conveyed, of applying external heat; but all the other means of recovery were employed with unremitting assiduity, in order, if possible, to compensate for the loss of so powerful a remedy: artificial respiration was, in particular, very constantly and attentively employed, but all to very little purpose; for, although there was evidently some irritability in the body, yet the vital functions could never be renewed. In the progress of the treatment there was one circumstance which pleased us not a little, and from which I entertained considerable expectations of a favourable termination; it was, that although no external heat of any consequence had been applied, yet after our remedies had been employed some time,

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there was a generous warmth diffused over the greater part of the body, and which I attribute to the action of the air on the blood in the lungs.

When the compression of the brain, and the distention of the right auricle and ventricle, and of the great veins connected with them, are removed; and when the irritability of the heart and vascular system is prudently increased by the proper administration of heat, it is from every consideration rendered in the highest degree probable, that we have done every thing in our power; we have removed the original cause,—have diminished the consequent effects,—and have increased the irritability as much as could be done consistently with prudence:—

dence:—in my opinion art can do no more. The event of the case will now depend entirely on the remaining powers of the constitution: if they are considerable, the heart will be enabled to act with force sufficient to propel the blood through the vascular system; but if the power of contraction is materially weakened, the blood will either not circulate at all, or else in so small a degree as to be insufficient to continue the necessary functions of life.

We will take this opportunity, however, of enquiring whether, under any, and what circumstances, other remedies that have been supposed particularly useful may be really so. The principal of these are electricity, particular stimuli adapted to the different organs of sense, and irritating medicines thrown into the stomach and intestines.

That shocks of electricity, when sent through the region of the heart, will stimulate it to contraction, is most certainly true ; and from this circumstance I some time since entertained very considerable expectations, from its application in the recovery of animals whose respiration had been suspended.

But since that time I have had better and more frequent opportunities of observing the real state of the heart, which I have in another place mentioned as continuing its contractions some considerable time after the external characteristics of life have quitted the body ; as, therefore, it already possesses not only the power of contraction, but does absolutely continue to contract, and that with apparently sufficient energy to propel the
blood

blood through the vessels, if there were no impediment to its passage, any additional stimulating power will be wholly unnecessary; and consequently it does not appear what good effect electricity can produce when applied to the heart.

It is not probable, either from reason or experiment, that it can have any influence on the brain, which is entirely of a pulpy substance; or on the lungs, which are destitute of muscular fibres, and are perfectly passive in respiration.

The next part on which it might operate with advantage, is the diaphragm, as it is so intimately connected with the vital organs, and is so readily excited to contraction; but even here its utility is not very apparent, for the action of the diaphragm can be of no further service than by producing motion of the lungs, and consequently a small degree of respi-

ration, which we know how to produce much more readily and effectually by other means.

If electricity is, therefore, ever admissible in the treatment of cases now under our consideration, it must be when respiration has long been suspended, at which time the action of the heart will necessarily be much diminished.

Although I do not expect any advantage from its application, yet, so far as I am able to judge, if it be prudently and cautiously applied it will not do any harm ; if a very strong shock is sent through any muscle, it will lessen its irritability ; and if it be frequently repeated, its power of contraction will soon be destroyed : the irritability of the system at large, however, will not suffer in the least, nor even the irritability of those parts that are in immediate contact with the affected muscle.

muscle. I have frequently sent strong shocks through one auricle or ventricle of the heart while both have been beating, till both the motion of the part and its power of contraction have been destroyed, and yet the one that has not been electrified has continued its contraction regularly, even for hours after. Small shocks, I have no doubt, in some degree lessen the irritability of the parts through which they pass, but it is so trifling as to be almost imperceptible; and on this account I would recommend, that the strength of the shock should be no greater than merely sufficient to occasion a contraction; what this precise degree is in the human frame I have not yet had sufficient experience to ascertain, although I can very well judge in various kinds of quadrupeds. I should, however, commence this operation with shocks about two or

three tenths of an inch, from a small vial containing not more than ten or twelve inches of coated surface ; if these did not produce effect, I would gradually increase both the length of the shocks and size of the vial ; and, proceeding in this manner, it will be impossible to do harm, let their strength be ever so great ; although I apprehend, if smart shocks from a pint vial do not produce effect, that it will not be possible to do it by any means whatever.

When an animal loses the external characteristics of life, he loses sensation and voluntary motion likewise : this is extremely evident, and very easily proved ; for if an animal is covered with water till it appears dead, it may then be opened and cut in every direction, without exhibiting the least motion or sense
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of pain from such treatment ; is is absurd, therefore, to suppose that remedies applied to parts destitute of feeling, and the power of motion likewise, can be productive of any effect whatever upon the part, either good or bad ; as well might we expect to operate upon the feelings of a stone, or any other inanimate substance, as to imagine it is in our power to excite those of animals under these circumstances. Irritating remedies applied to the skin, and all the other stimuli adapted to the different organs of sense, cannot therefore be of the least benefit while sensation and voluntary motion are suspended.

From the sympathy that is well known to exist between the stomach and the vital organs, more particularly when in a state both of health and disease, we are led to conceive, that exciting its action
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may, be productive of advantage in the present situation; and so most assuredly it would, were we able to effect it; but as the nerves of the stomach are in the same state as those in the other parts of the system, that is, deprived of their power of action, it will not be possible for us, by any means, to produce any sensation or action whatever in the stomach, until the energy of the brain be in some measure restored.

All this is confirmed by a variety of experiments, for I was never able to observe that any stimulus applied to the internal surface of the stomach produced a perceptible effect; if a solution of white or blue vitrol, or emet. tartar, were injected, it did not produce vomiting; nor did stimulating medicines increase either the strength or quickness of the heart's motion when respiration and the usual action

tion of the brain were interrupted, and consequently when sensation and voluntary motion were suspended, and the usual signs of life had disappeared.

Applications to the internal membrane of the intestines will be attended with no better effect; but even if it were possible to act on their nerves, and excite the peristaltic motion, it does not appear what influence this would have on the vital functions, and the system at large; for the peristaltic motion will continue sometimes upwards of two or three hours after the appearance of death has taken place, it will even continue after the brain is removed from the body, nay after the intestines themselves are removed: the reason of this I apprehend to be, that the fæces are the proper stimulus of the intestines and the most powerful that can be applied to them; for if any other stimulus,

lus, such as warm atmospheric air, air loaded with the effluvia of aromatic substances, warm water, aromatic decoctions, or electricity, be recurred to, after the motion has once ceased, it has never happened to me to observe that they were reproduced. The nature of this stimulus is not affected or altered by any change that takes place in the system, and therefore it continues to exert its effects on the intestines so long as their irritability remains. So that it does not seem, even if it were in our power to continue or increase the peristaltic motion of the intestines, that it would be in any respect advantageous.

If these remedies are at any time capable of producing good effect, it must be when the principle of *sensibility* is in some measured returned;—that is, when the body begins to discover some appearances
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of life,---at this time it may be judged unnecessary,---but from various considerations I am disposed to believe that they may be of much real benefit. I will not, in this paper, dwell particularly on them as it seems to me that I have already done that sufficiently in another place. I will content myself with observing, generally, that stimulating remedies of every kind, applied to the different organs of sense, will increase the excitement and energy of the brain, and the other vital functions must of necessity be increased also.

In cases of extreme debility arising from other causes, and where all the vital actions are much diminished, a similar mode of treatment is adopted with much success; blisters are applied to irritate the nerves of the skin, the volatile alkali to stimulate those of the nostrils, and a gene-
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rous cordial is thrown into the stomach ; it is well known that any of these remedies applied individually will rouse the languid powers of life, and increase the action of the heart and arteries ; but if they all are had recourse to at the same time, then the effect will be proportionably powerful.

I am still of opinion that the action of vomiting, if excited by such medicines as do not occasion a preceding or consequent nausea, may be productive of much good. Nausea weakens and debilitates the animal powers to a very great degree ; it is self-evident, therefore, that it must be extremely prejudicial in such cases as we are now treating of, and ought most particularly to be avoided ; but full vomiting may be effected without inducing any such symptoms : it then produces a strong action in the stomach, diaphragm, and

and abdominal muscles ; the consequence of this action must necessarily be a stronger propulsion of the blood throughout the whole vascular system, but more particularly through the brain and all the abdominal viscera : stagnations of the blood in the inferior order of vessels will be overcome, and by such means, it is probable, the equable circulation of the blood throughout the whole system will be effected sooner than by any other.

Of what, and how great, importance the establishment of a free circulation must be, is evident to the most ignorant ; suffice it to say, that if a perfect recovery does not ensue after such appearances, it must, in my opinion, be attributed to improper treatment.

From what has been said, therefore, I conclude, that neither stimuli applied to the different organs of sense, or irritating
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medicines thrown into the stomach and bowels, can produce any effect while sensation and voluntary motion are suspended; but that they are capable of producing much advantage, if applied when the principle of sensibility is in some measure returned.

A P P E N D I X.

I have, upon a former occasion, mentioned the electrical shock as being the *test* or *discriminating characteristic* of any *remains of animal life*, and my subsequent observations and experiments have confirmed me in the opinion that it is the only means by which we can distinguish between absolute and apparent death.

It may not be amiss, however, in this place to observe, that as the irritability is different in different parts of the body, and as it is materially diminished in some parts before it is at all affected in others, electricity, applied to a *particular part*, cannot be considered as an accurate and perfect evidence of the state of the *whole*

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system: to determine this, therefore, with precision, it will be necessary to pass small flocks in various directions through the body, when, if they produce contractions, we may be certain the parts through which they were sent are alive; if not, that they are absolutely dead*.

If tolerably strong contractions follow very small flocks, the remaining powers of life may be deemed very considerable;

* The length of time the irritability continues, and the part it continues in, are different in different experiments. Five hours and an half is the shortest, and twenty-three hours and forty minutes is the longest, time I have observed the irritability to continue in the heart; in some it has continued longest in the right auricle, but in at least as many it has continued longest in the left auricle: sometimes I have found it has quitted almost every part of the heart one, or even two hours, before it had left the extremities; but I have met with but few instances where it remained in any other part after it had entirely quitted the heart.

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but if strong shocks are requisite to produce trifling motions, the irritability must be almost entirely exhausted.

In this manner, therefore, we may judge with great accuracy concerning the degree of vitality remaining in all the external parts of the body ; and may likewise determine, if we observe attentively, the motion of the diaphragm ; but I do not know in what manner we can perceive the contraction of the heart, in which organ the irritability most commonly continues the greatest length of time, more especially if respiration has long been suspended, for then the left ventricle and arterial system being almost destitute of blood, we cannot feel any thing like a pulsation in the larger arteries, a circumstance that may indicate when respiration has lately ceased, as at that time the left ventricle, and arteries

proceeding from it, contain a quantity of blood.

An animal body cannot be said to be positively and absolutely dead, so long as any part of it can by any means be brought into a state of contraction; but it is far from being necessary, when we wish to determine whether the body is in a recoverable state, to be certain that every part has lost its irritability; for I am satisfied, by abundant experiments, that the irritability may, and does continue, in *every part of the body*, a considerable time, sometimes an hour or two, after the animal could not be recovered.

Upon the whole then, and from the experiments I have made, I am sufficiently convinced,

That, in cases of what is usually called sudden death, a recovery is not to be expected if the irritability of any of the
extremi-

extremities is destroyed, or even if it is materially diminished *.

In a late publication on this subject it is said, with some degree of exultation, that

* Mr. Coleman says, my opinion that the electrical shock is to be admitted as the test or discriminating characteristic of any remains of animal life—"is fraught with imminent danger and a dangerous prognostic built merely on hypothesis"—after this, it is reasonable to expect that a man of candor should offer something in the shape of an experiment—or state facts in its support:—no such thing—the only way in which he supports it is, by joining this idea of electricity with an opinion I had elsewhere expressed "that irritability and vital heat appear to be co-equal" "which opinion" he says, "is incompatible"—now whether the idea of the criterion is correct or erroneous, is not in the least affected by what he says, but it clearly proves the very high idea he entertains of his own notions, over the *facts* and *experiments* of others.

“ whenever the functions of an animal are suddenly suspended, and the body puts on the appearance of death, it is always in our power to determine whether it be really dead, by restoring the temperature, and by inflating the lungs with proper air.” It does not appear, however, that there is any thing new or important in this observation ; for if an animal does not recover from such treatment, there are very few who would expect it to recover from any other. Dr. Goodwyn has not stated any particular length of time as being requisite to make the determination ; so that in one sense he is sure to be right, for if these means are made use of without effect for several hours, it will not be doubted that absolute death has taken place.

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When a kitten, or young puppy, is drowned in the usual manner, all voluntary motion ceases, the senses are abolished, and the animal appears perfectly dead in about one minute and twenty seconds. In a very short time, however, from fifteen seconds to one minute, it is affected with a violent and general convulsive motion: this motion is strong, regular, and slow; sometimes remaining near five seconds. It returns in a few seconds, and is repeated two or three times in every minute, sometimes for the space of a quarter of an hour, but more commonly, and at a medium, for about ten minutes after the natural struggling has ceased.

I am persuaded this convulsive motion is entirely an extraordinary exertion of the remaining powers of life to continue respiration, and for this reason, that the diaphragm and abdominal muscles are

more particularly concerned in the action; but all the muscles connected with respiration, both ordinary and extraordinary, are contracted likewise; the convulsion is also attended with a kind of gasping, which is a further corroboration of the opinion: indeed it is placed out of all doubt, for if the animal be removed from the water, it remains perfectly still till the convulsion returns, which is accompanied with a very deep inspiration, and succeeded in a few seconds by an expiration.

Several experiments were made upon the following plan;

EXPERIMENT.

In the space of a minute after the strugglings had ceased, the animal was removed from the receiver and exposed to the open air; inspiration accompanied the

the next convulsive motion, and respiration was soon established.

The same event happened when the animal was withdrawn at the end of the second, third, and fourth minute; they seldom recovered at the fifth or sixth, and I do not perceive by my notes that any revived after the seventh, although they might make several imperfect respirations after that time.

As far as my experiments upon such animals as are here instanced have gone, we may be allowed to conclude, that they will very generally recover their vital functions, after the natural strugglings from drowning have ceased for the space of four minutes,

I made a few experiments with the view of observing the longest general period at which it would be possible to reco-

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ver animals that had been immerfed in water, by the fingle remedy of reftoring refpiration ; the fufpention of which was the caufe of inducing the appearance of death. I had not an opportunity, however, of purfuing this interefting fubject with that accuracy or attention to which it is fo defervedly entitled, on account of the difficulty of procuring a fufficient number of fubjects for experiments. All that I fhall therefore, at this time, mention refpecting it is, that although I have been able, by imitating natural refpiration, to recover fome animals after they had been eight, ten, or twelve minutes under water, I have obferved feveral inftances when the operation had been performed with accuracy in which the animal did not recover, notwithstanding it had not been immerfed fo long as fome others that had recovered fpontaneoufly.

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I cannot venture to draw any general conclusion from the event of my experiments on this part of the subject. If, however, I might be allowed to form any *opinion* upon it, it would be this: that restoring suspended respiration will probably not be sufficient to renew the vital functions, if it be not attempted before the convulsive motions of the animal have ceased*.

* I have before remarked, that the continuance of this motion is uncertain; the soonest I observe in my notes is three minutes, the longest twenty; but the medium of many experiments is eleven minutes and thirty-five seconds; the probable time of recovery, therefore, will vary likewise, but the average may perhaps be about eleven minutes and a half also. It is a subject, however, that demands a further investigation,

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From the appearances on the dissection of animals that have been hung, it is natural to conclude that their death arises from the same cause as those which are drowned,---a suspension of the action of respiration. I have always, however, had so much difficulty in conceiving how it was possible, that the trachea could be so completely shut by the pressure of the cord, as wholly to intercept the passage of the air, that I could not allow the death of the animal to be owing to that cause only, although I did not hesitate to admit it as the principal one.

Considerable light may be thrown on this circumstance, by hanging an animal whose trachea is not included in the ligature, or into whose trachea an opening has previously been made, so that the passage of the air into and out of the lungs may not be intercepted; if an animal in this situation should die in the same, or
nearly

nearly the same time that another animal of the same age and species would die hung in the usual manner, the death of animals that are so hung must be attributed to some other cause than a suspension of respiration: but if the animal should live any considerable time longer than usual, its death should then be imputed to that circumstance only.

EXPERIMENT.

A dog was hung in the usual manner; in eight minutes his struggling ceased, and in nine minutes the pulsation of the heart could not be perceived.

EXPERIMENT.

An opening was made into the trachea of a dog about two months old, and a ligature being passed round his neck above the opening, he was hung as usual: he

he struggled for some time, but breathed freely through the aperture in the intervals of struggling: in this kind of way the animal continued for the space of an hour and an half, when he was cut down, and appeared to have received but little inconvenience from the suspension. Early the next morning he escaped from his place of confinement, and became so troublesome to the servants that they turned him away.

If the death of animals that are hung arises from the pressure of the cord preventing the return of the blood from the brain, the animal should die very soon when a tight ligature is made round the blood-vessels of the neck without including the trachea.

EXPERIMENT.

The trachea of a dog was separated
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from the contiguous parts, and a cord passed under it and round the vertebræ of the neck, so as to include every blood vessel of the neck, but to leave the opening into the lungs free and pervious. One end of the rope being then fast to a fixed point, the force of three men was exerted to draw it tight, which being continued several minutes, he was left suspended, the cord still drawn moderately tight. In this situation the animal continued alive two hours and ten minutes, and it seemed as if he then died more in consequence of his own exertions than any other cause.

From these experiments it appears,

That the death of animals which perish from hanging is not occasioned by any compression of the nerves, arteries, or
veins

veins of the neck, but is owing entirely to the trachea being shut by the pressure of the cord, and thus causing a suspension of respiration.

I cannot omit this opportunity of making some remarks on one or two instruments lately recommended for inflating the lungs.

Dr. Goodwyn intends that his syringe should inflate the lungs and draw the air out again; and this it appears as if it would do very effectually; but yet, if I understand the construction of the instrument, one half of the air last expired, or what remains between the opening (a) and the lower part of the cylinder, will be again forced into the lungs, because there is no opening at the lower part to permit

permit the escape of the air, as there is at the upper part ; and of this the Doctor seems aware when he says the *greater* part of the expired air escapes into the atmosphere. If the blood of an animal under the circumstances we suppose our subject to be, has the power of phlogisticating air thrown into the lungs, the air next expired will of course be worse than when thrown in : only half of this foul air, however, is thrown out of the instrument, the remainder (half of which is air that has once been in the lungs) is mixed with the same quantity of fresh air, and thrown into the lungs again ; hence it is evident that the air thrown in becomes worse every time, and that, in every point of view, air from the lungs of an healthy person would be preferable.

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I have before remarked, that it would be advisable to introduce as large a quantity of air into the lungs, as they can well contain, and this, whether it be done on the supposition of the air acting chemically or mechanically: one hundred inches is recommended,—but as our lungs will hold three times that quantity without inconvenience, I think it would be advisable to use three times as much.

In giving the description of a fumigator, Dr. Cogan makes this remark, “some have been constructed so as to work with a pistern in the manner of a syringe,” but “they are *expensive, complicated, and soon out of order, and are worked with great labour and fatigue,*”

This instrument is, however, said to answer the purpose of extracting water from the lungs, as well as of throwing air into them.

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When it is intended to answer this purpose, the instrument acts in the manner of a common air-pump, though, as the pistern is drawn but half way up the cylinder, only fifty inches of air can be drawn out. Dr. Goodwyn has shewn in another place, that there are upwards of one hundred inches of air in the lungs of dead persons, so that not half of the air in the lungs will be extracted. The only way in which an instrument of this kind can operate so as to effect the extraction of water, must be by diminishing the capacity of the air-cells, and in this manner half their contents, whether air or water, will of course be evacuated ; for evident reasons the air will first be drawn into the cylinder, and the greater part of the water will remain in the lungs, till, if it could be so contrived, by repeated exsuctions, the cells of the bronchia are drawn so close together that their contents must be ex-

pelled. In order to explain more correctly the effect of this instrument, let us suppose a person taken out of the water with a considerable quantity (fifty inches for instance) of water in his lungs : the instrument being properly applied, fifty inches of something are drawn out of the lungs ; by far the greater part of this will, of course, be air, because that being lightest will be uppermost ; and if any quantity is confined in the bronchia by the water, it, by means of its great elasticity, will force its way through the water when the first exhaustion has taken place. As soon as the instrument is removed, the external air will occupy the place of whatever was drawn out by the first operation ; so that when the instrument is used again, the fresh air, which has just entered, is extracted, but the water must still continue almost the same in the lungs,

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and so it must, let the operation be repeated ever so often, and for the same reasons.

From this view, it appears that this instrument possesses no advantage over those in common use for inflating the lungs; and that, in the state in which it is here described, it will not answer the purpose of extracting water from the lungs, although with some alterations it might be made to answer that purpose effectually; but how safely, I will not pretend to say; of that point I have many doubts,

EXPERIMENT.

I procured an hollow glass globe, capable of containing a few ounces; two openings were made into it opposite each other; in one I fixed a valve of oiled silk, this valve would allow air to pass from

the globe, but not into it ; and by means of a screw it was connected with a small exhausting syringe : in the other opening of the globe I fitted a tube proper to be introduced into the trachea ; the instrument was now in effect an air pump, the globe answering the purpose of a receiver, and the valve connected with it allowing every degree of exhaustion that might be required. If the pipe of this instrument be introduced into the trachea of a drowned animal, and the air drawn out of the globe, whatever is in the trachea or lungs, will be brought from thence into the globe. The pipe was therefore introduced into the trachea of a small animal, and the pistern gradually drawn up, but, notwithstanding this attention, some of the blood-vessels were ruptured, for as much blood as water was perceived in the globe ; the operation, therefore, of extracting

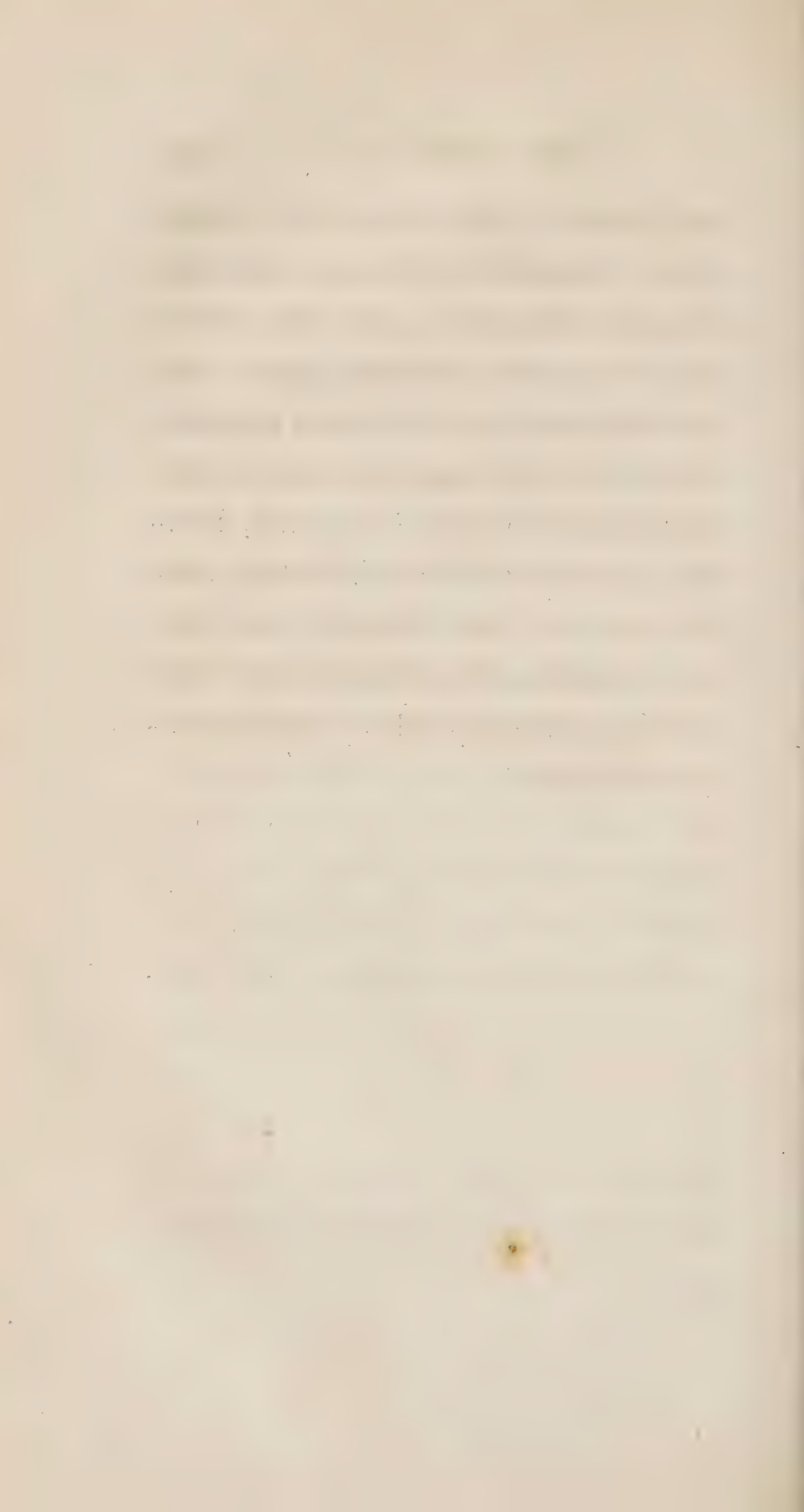
tracting water from the lungs by any exhausting instrument, is, on account of the danger attending it, what I shall never attempt, except in my experiments on brutes.

It is possible, however, that there may not be so large a quantity of water in the lungs as to render it necessary to have recourse to any particular method of removing it: I always concluded so from the event of my own experiments, and my opinion is not altered by the small quantity Dr. Goodwyn mentions to have found in his; for if the water were even in greater abundance, I should not apprehend that it would prove any material impediment to *the action of the air on the blood*, for we daily see that the colour of the coagulum changes soon after it is

drawn from the vein when it is considerably below the surface of the serum. In certain cases of catarrh likewise, and where, from general relaxation of the vessels of the lungs, a great secretion of mucus takes place, we have reason to think that sometimes, and in particular cases, the whole of the air-cells are occupied with mucus instead of air, and yet the atmosphere exerts its usual influence over the blood in the lungs; so that if these circumstances are true, and no one can deny them, it does not appear why a very thin surface of water should render it “impossible to apply the fresh air sufficiently near to change the quality of the blood.”

A pair of double bellows has lately been made known to the public; they
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are, as well as the instrument last described, intended to imitate expiration as well as inspiration, and, from the account I have seen of them, appear very well calculated to answer those purposes, if they are large enough to contain a sufficient quantity of air. I do not, however, perceive the least advantage these can have over Mr. Hunter's, and their very complicated construction will render them extremely liable to be frequently out of order.



AN ACCOUNT
OF THE
MEDICINAL EFFECTS

OF THE
RESIN OF THE ACOROIDES RESINIFERA:

OR
YELLOW RESIN,
FROM BOTANY BAY.

I SOMETIME since received a small piece of a yellow gum * from Botany

* Strictly speaking, it should be called a *resin*, as will be seen by the experiments I have made with it:—but, partly to avoid confusion, as it has hitherto been called and described by the name of a *gum* only,—partly, because its proper name is not yet finally settled—but more particularly, as a great variety of *resins*, are by universal consent called *gums*, such as gum elemi,—gum anime—gum hederæ—gum juniper—gum benzoin—gum tacamahac—gum copal—gum labdanum—gum mastich—gum storax—gum sandarac—gum guaiacum, &c.—as well as all the *gum resins*;—I thought it would be better, at least for the present, to continue the name as I received it.

Bay,

Bay, and was at the same time informed, that it had been found very useful in many complaints of the stomach.

I happened just at that time to have a patient under my care with a very troublesome complaint in his stomach,—it appeared to be either dyspeptic, or spasmodic, I was not perfectly satisfied which :—he had been vomited—his bowels been opened—and he had taken opiates, bitters, and æther, without any apparent advantage—all the medicines except the opium seemed to disagree, and they afforded only a temporary relief.

I thought this a fair opportunity of trying the effect of my new gum,—and I gave him ten grains rubbed with a little common water,—with directions to take such draught every six hours, provided he did not find them to disagree.

At the time of his taking the first draught,

draught, he was almost as bad as he had been at any period of the complaint :—it, however remained upon his stomach, and he observed that it did not produce that disturbance which his food or other medicines had been used to do. After the second draught, the sickness, fulness, and pain, of the stomach, materially abated ;—and when he had taken the third, he thought himself so much better, as to have no occasion for any further medicine : he, however, desired to have a few more that he might secure against a relapse ;—these he took the next day, and the day following, he was so well as to be able to go about his usual business.

I was very well satisfied with the event of this case—for although I would not venture to attribute the sudden alteration, altogether to the effect of the medicine, yet it proved that the remedy might in
similar

similar cases be given not only without the least apprehension of inconvenience, but with very probable expectations of material advantage.

Another case occurred soon after, in which it seemed to produce very good effects ;—and this fixed my resolution of examining its chemical properties,—and of attempting to discover its medicinal effects.

All the information I have been able to collect respecting the history of the yellow gum is the following :

“ The plant that produces it is low and small, with long grassy leaves ; but the fructification of it shoots out in a singular manner from the centre of the leaves, on a single strait stem, to the height of twelve or fourteen feet. Of this stem, which is strong and light, like some of the reed class, the natives usually make their spears. The resin is generally dug up out of the soil under the tree, not collected from it, and may perhaps be that which Tasman calls “ gum lac of the ground.” See Philips’s Voyage, p. 59, 60, where an accurate engraving is given of the Plant.

Mr. Bowes, the Surgeon of the Lady Penrhyn gave me a somewhat different account; and as this gentleman appeared

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to have paid considerable attention to the subject, his account may certainly be relied upon.

After describing the tree in precisely the same manner as above, he observes, that at the top of the trunk of the tree, long grassy leaves grow in great abundance. The gum is found under these leaves in considerable quantities : it commonly exudes in round tears or drops, from the size of a large pea, to that of a marble, and sometimes much larger. See specimen No. I. These are by the heat of the sun, frequently so much softened, that they fall on the ground, and, in this soft state, adhere to whatever they fall upon ; hence the gum is frequently found mixed with dirt, wood, the bark of the tree, and various other substances. See specimen No. II. He has seen one lump composed of many small pure pieces

pieces of various sizes, united together, which weighed nearly half an hundred weight. It is produced in such abundance, that one man may collect thirty or forty pounds in the space of a few hours. The convicts have another method of collecting it ; they dig round the tree, and break off pieces of the roots which always have some, and frequently considerable quantities of the gum in them. This gum appears nearly, but not entirely, the same, as that which exudes from the trunk of the tree : the former is often mixed with a strong smelling resinous substance of a black nature, and is so interwoven in the wood itself, that it is with difficulty separated : See specimen No. III. The black substance appears a pure unmixed resin.

The following experiments were made principally with the view of determining what menstruum would dissolve the gum the most readily, and in the greatest quantity.

EXPERIMENT. I.

Thirty grains of the bright yellow gum in powder, was agitated in a vial with one ounce of spring water ; it readily mixed with water, but it did not appear that much was dissolved. In three days, the water was filtered through paper ; it retained a strong flavour of the gum, and on evaporation, four grains of matter were encrusted very firmly on the sides of the glass.

II.

II.

Thirty grains of pure yellow gum was boiled several minutes in a Florence flask with eight ounces of spring water ; while boiling it was passed through fine tow—the liquor was evaporated, and gave five grains and a half of extract.

III.

Thirty grains of the same gum in powder, was added to one ounce of alcohol, they were shaken together till the gum was dissolved. On evaporation it became a beautiful transparent balsam.

IV.

Thirty grains of the same gum in powder, was in the same manner agitated with one ounce of rectified spirits till it was wholly dissolved. On evaporation it became a beautiful transparent balsam.

V.

Thirty grains were treated in the same manner with one ounce of brandy—and the gum was dissolved. On evaporation it yielded an opake gummy resin.

VI.

Thirty grains were added to one ounce of ether; it wholly dissolved,

VII.

The same quantity was added to one ounce of *spt. æther. vitr.*—and also to one ounce of *spt. æther. nitros.*—both dissolved all the gum entirely, and only a very small quantity of grit remained on the filter.

VIII.

Thirty grains were added to one ounce of *aq. kali pur.* and it was entirely dissolved.

IX.

IX

Thirty grains were added to one ounce of each of the following wines—port, calcavella, and cyder. On filtering the wines and evaporating them the port gave eight and a half grains:---the calcavella eighteen grains of very tenacious extract; ---and the cyder twenty-five grains of tenacious extract.

X.

Thirty grains were added to one ounce of aq. kali---the liquor becomes of a deep yellow colour---the gum floats at top, and very little solution appears to have taken place.

XI.

Thirty grains added to one ounce of aq. ammon. pur. forms a very deep tincture---

L 4

ture---but the gum collects into a lump, and appears to be very little dissolved.

XII.

Thirty grains were mixed with one ounce of acid. vitr. dil. the liquor becomes of a pale yellow, and the gum remains immovable at the bottom.

XIII.

Thirty grains mixed with one ounce of acid. nitros. dil. emitted many air bubbles---and continued to do so a week afterwards. The quantity of the gum did not appear to be lessened.

XIV.

Thirty grains mixed with one ounce of acet. distil. produced a very pale yellow: the gum collected into a lump, and appeared to be very little dissolved.

XV.

XV.

Thirty grains mixed with one ounce of ol. tereb. produced a very pale yellow ---the gum collected into a lump at the bottom of the vial. By boiling it dissolved three parts of the gum.

XVI.

Thirty grains mixed with one ounce of ol. oliv.---the gum does not appear to be dissolved. On boiling about three fourths of the gum seemed dissolved.

XVII.

Thirty grains of the gum were added to a mixture of one ounce of water, and one dram of quicklime. It produces a high bright coloured tincture, and seemed as if it had dissolved about ten grains of the gum.

XVIII.

XVIII.

Thirty grains of the gum were added to one ounce of lime water---it did not appear to have dissolved so much as spring water.

XIX.

Thirty grains of the gum were added to a mixture of one ounce of water and ten grains of kali---it produced somewhat of a dark colour, but does not seem to have taken up much of the gum.

XX.

Thirty grains of the gum were added to a mixture of one ounce of water and one scruple of magnesia :--on filtering and evaporating, the liquor gave two grains of extract.

XXI.

XXI.

Camphor mixed with the gum, dissolved it after some time, but it does not promote its solution in water.

XXII.

Half a dram of gum arabic in powder was made into a mucilage: thirty grains of the yellow gum was then well rubbed with it, and two ounces of spring water added by degrees: after standing some time, the greater part of the gum falls to the bottom.

XXIII.

With the view of determining the greatest quantity of gum that rectified spirit will dissolve, I added thirty grains to one ounce of the spirit: as soon as it was dissolved, I added thirty grains more
---and

—and continued to add, sometimes that, sometimes double the quantity, till I found it became of so thick consistence, it would not dissolve any more :---in this way, and in the space of about a month, one ounce of rectified spirit dissolved two ounces of the powdered gum---at which time the tincture was of the consistence of treacle. Ether.---Spt. ether. vitr.---Spt. ether. nitr. each took up eleven drams, in one day.

Brandy treated in the same manner, in the space of a month, was made to suspend seven drams, which were added at eleven different times, I say suspend, for the brandy did not retain the gum in perfect solution---at the top of the vial there was about three drams of a clear, light, yellow fluid: below this, a quantity of light matter, resembling the gum dissolved, and deposited in a light loose state; this, and the
yellow

yellow fluid, occupied nearly the same space in the vial:---under this, a dark brown liquor, not transparent, in quantity about one ounce; and at the bottom of the vial about twelve or fifteen grains of the gum undissolved.

The transparent yellow liquor was decanted---it contained but a small quantity of spirit, for it would not take fire when a lighted paper was applied to it, till it was heated, when it caught fire, and about one third burnt away: the residuum was like milk: it was evaporated, and only four grains of light gum remained. What remained in the vial was too thick to pass the filter.

XXIV.

Alcohol, rectified spirit, brandy, ether, fpt. etheris nitros: fpt. ether vitr: and aq: kali pur: dissolved the gum completely

pletely and in considerable quantities :— this experiment was made to shew which of these would dissolve a certain quantity of the gum the most readily. Thirty grains of the gum in powder were added to each of the above; they were then briskly shaken together, and required the following time to make the solution.

	Alco- hol.	S.V. Rect.	Brandy	Ether.	Eth. Nit.	Eth. Vier.	A.Kali.
1st. 30 grains required	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	
	1m.	1m.	2m.	0 45	1 30	1 30	2m.
2d. 30	1m.	1m.	4m.	1	1 30	1 30	3m.
3d. 30	1m.	1m.	12m.	1	1 30	1 30	would
4th. 30	1 15	1 15		1	1 30	1 30	not dis-
5th. 30	1 30	1 30		1	1 30	1 30	solve
6th. 30	1 30	1 30		1	1 30	1 30	any
7th. 30	1 30	1 30		1 45	1 30	1 30	more.
8th. 30	1 30	1 30		2 30	1 30	1 30	
9th. 30	2 15	2 15		3	1 30	1 30	

T H E
F O L L O W I N G T A B L E

Shews the quantity of gum that is dissolved
by one ounce of various menstrea.

	3	3	3	gr.
Alcohol	2			
Rectified spt. . . .	2			
Ether	1	3		
Spt. eth. Vit. . . .	1	3		
Spt. eth. nitr. . . .	1	3		
Brandy		7		
Lixiv. Sapon. . . .		1		
Cyder			1	5
Calcavella				18
Calc. viv. et. aqua .				10*
Port				8 $\frac{1}{2}$
Ol. tereb.				4*
Water				4
Aq. kali				3*
Aq. ammon. p. . . .				2*
Acid. vitr. dil. . . .				2*
Acid. nitr. dil. . . .				2*
Acet. dist.				2*
Aq. calcis				2*
Ol. oliv.				2*

Where

Where asterisks are placed, it shews that the quantity dissolved is calculated, as it would have been impracticable in many instances to determine the exact quantity by evaporation.

XXV.

Thirty grains of the gum were mixed with eight ounces of water---the infusion was continued several days during which time it was frequently shaken. It was afterwards filtered.

One ounce of the filtered liquor was mixed with two drams of aq. kali---no effervescence ensued---the liquor became of a bright yellow colour.

One ounce of the filtered liquor was mixed with two drams of acid. vitr. dil. no effervescence, or change of colour ensued.

One

One ounce of the filtred liquor was mixed with one dram of a solution of sal martis---the mixture assumed somewhat of a dark colour.

One ounce of the filtred liquor was mixed with twenty drops of a solution of sublimite---no alteration in colour took place.

XXVI.

Half an ounce of the gum was distilled in a glass alembic, with a pint of spring water, nearly a pint of water smelling somewhat strongly of the gum, came over. The residuum when dried weighed three drams and half. This dissolved in spirits.

XXVII.

Half an ounce of gum was distilled
M with

with a pint of rectified spirit---the spirit came off pure.

XXVIII.

Half an ounce of the powdered gum, was put into a small glass retort---it was placed in a water bath: at 180 degrees, the powdered particles began to unite, and almost to flow. The retort was then placed in a sand heat, and very soon, about half a dram of insipid water came over---then about one dram of a dark, heavy, empyreumatic oil. About two ounces of water was then added to the residuum---it was distilled, and the liquor that came over, had a very strong smell of the oil.

XXIX.

The gum inflames in the naked fire---but if thrown on a red hot iron, it is
mostly

mostly dissipated in white fumes. On treating one dram of pure yellow gum in this last manner, a cinder remained on the iron, weighing seven grains.

XXX.

Half a dram of the residuum, obtained in the same manner as in the last experiment, was infused in four ounces of spring water; in a few days it was filtered, and the lixivium was tasteless.

To one ounce of this lixivium was added one dram of the diluted vitriolic acid—not the least appearance of effervescence.

To half an ounce of this lixivium was added one dram of aq. kali. Not the least appearance of effervescence.

To half an ounce of this lixivium was added one dram of syrup of violets—the colour of the mixture was exactly the

M 2 same

same as when the syrup was diluted with the same quantity of spring water.

To half an ounce of the lixivium, thirty drops of an infusion of galls were added:—scarce any alteration in the colour ensued:—if any, the mixture became somewhat darker.

To half an ounce of the lixivium, ten drops of a solution of sal. martis. were added:—it did not make any difference in the appearance of the mixture.

I content my self with merely relating the event of these experiments, and shall leave it to the reader, to draw what conclusions from them he may think proper.

I now proceed to lay before the Society, the cases of several patients in which it has been administered under my own eye : and several cases likewise, wherein it has been given under the direction of other medical gentlemen, who have employed it at my request.

C A S E I.

Mr. Stables was suddenly seized with a violent vomiting and purging, which in a very few hours brought him into a dangerous and alarming situation—by proper management however, and the assistance of considerable quantities of opium and aromatics, the violence and severity of the disease was, in a short time abated, and nearly as soon as this was done he left off his medicines. His constitution in general, and his stomach in particular,

however, suffered so much in consequence of this attack, as to disable him from following his business a considerable time after:---sickness and sometimes vomiting---and a constant pain in the stomach, which two or three times a day increased to a violent degree---together with what is called a bilious aspect, and very high coloured water, made me apprehensive of some serious *disease* about the stomach or liver. In this state he had continued a month. He was still unwilling to take medicine, but knowing him to have a piece of the yellow gum by him, I directed him to infuse it in three or four times the quantity of brandy, and to take two tea spoonsfull of the clear tincture, two or three times a day, and as often as the pain was more violent than usual:---This after some time was complied with, and *he found immediate relief from the very first dose*:---the pain would often
return

return in a slighter degree, but he informed me that it *always* gave way as soon as he had taken the drops.

It may be suspected that the great and immediate relief this patient experienced, might be in a good measure, if not entirely, owing to the tea spoonsfull of brandy in which the gum was dissolved---but both before and while this plan was pursuing, a large quantity of pure brandy was had recourse to, without any sensible advantage.

C A S E II.

Mrs. Brett—a spasmodic complaint remaining in her stomach after a fever:---the fever was removed---and this symptom treated with one dram of the tincture of the gum, twice or thrice a day:---by taking eleven doses, this was cured, and her appetite and strength returned.

C A S E III.

Mr. Chambers---had an apoplectic fit, from which he was recovered by bleeding:---a great and universal prostration of strength remained without any other concomitant symptom: for this I directed a scruple of the gum to be taken twice a day, and when ten doses had been taken, the debility was so far recovered as to enable him to return to his usual occupation.

C A S E IV.

Mr. P---t, about 40 years old, an irregular liver, and subject to violent epileptic fits, on any particular, or long continued excess. On the 4th of August he was attacked with one, different in some respects to those he had been subject to before. When recovered from it, he found a much greater degree of general debility

debility than he had been used to experience before, and likewise a pain and relaxation of the stomach to an unusual degree. The bowels were kept open, and he took quaffia and ether :---the same sensation however continuing, on the evening of the 6th he had draughts, with one scruple of the powdered gum mixed in water, and one dram of Tr. Cinn. comp: ---the day following he took three---on the 8th the quantity of gum was increased to half a dram, which agreed very well, and he was so much mended as to render any further assistance unnecessary.

C A S E V.

Mr. Webster---aged 70 ; a great degree of debility from an immoderate flux of blood from the nose.---After taking a considerable quantity of bark without any seemingly good effect, one scruple of the
extract

extract was given thrice a day:--the dose was gradually encreased to double that quantity,--and in three days this patient perswaded himself he had received considerable benefit from this remedy.

C A S E VI.

Miss S---s, a young lady about 19, on the 3d of August was taken with hysterics:--she was very well in health before they came upon her, but on leaving her, she had a very severe pain in the stomach and bowels---for which opiates, joined with rhubarb, and antispasmodics were given, without effect. Aperient medicines were then given, but although frequently repeated and assisted by enemas of various kinds, a passage through the bowels could not be procured till the evening of the 7th.---Some
con-

considerable degree of pain and uneasiness remained, for which the conf. opiat. with ether was given, but without much advantage:---on the 9th she took one scruple of the powdered gum, mixed with simple water by the assistance of mucilage of gum arabic---it agreeing very well, it was repeated twice that day, and twice the day following:---she said she gained evident advantage from the medicines---and she appeared so much better that I recommended her not to take any more,

C A S E VII.

Miss H——n, about 22 years old---of a constitution exquisitely irritable, and extremely susceptible of hysterical affections. This young lady was at times, excessively harrassed with a very violent and uncommon disturbance of the stomach and bowels---the abdomen would
 swell

swell to an enormous degree, and be attended with considerable pain :---at other times the swelling would not be so great, but then the abdominal muscles would be seized with a convulsive motion, beginning at the scrobiculus cordis and gradually passing along the muscles, to the pubis :---it would then return in the opposite direction, from the pubis to the scrobiculus cordis. As there was always some considerable quantity of air in the bowels, and as the bowels were necessarily affected by the motion of the muscles, a very loud and particular noise always attended. I am unable to convey a proper idea of it, but as it evidently arose from the passing of the contents of the bowels from one part to the other, it may readily be conceived. To remove, or abate these complaints, I had given every thing which an attentive consideration

tion of the case could suggest: particular attention was paid to the proper regulation of the state of the bowels; a very fair chance was given to the quassia, in substance and infusion---to the bark---steel---zinc---and cold bathing;---and when the symptoms were urgent, foetid medicines, the volatile alkali, ether, and opiates were had recourse to, and in considerable doses---but with so little effect, either as to diminishing the present symptoms, or preventing a return of them---that I am in doubt whether she derived any benefit from them. A Physician of very considerable eminence and respectability, resident in this part of the country saw her:---she had likewise the opinion of two other Physicians in London---their directions were followed with exactness, but without any advantage.

On

On the 16th of August last, she had a severe return of hysteric faintings, and its usual attendant, the convulsive disturbance of the abdominal muscles :---something was to be done, and as our former plan had so often failed, I relinquished it, and gave a scruple of the yellow gum, with the same quantity of gum arabic, in common water---a draught of this kind was repeated two, three, four or five times a day, according to the severity of the symptoms, till she had taken nineteen doses, when she was so much better, as not to require any further immediate assistance. It was evident in this case, both to the patient as well as myself, that greater advantage was gained from this medicine, than from any other she had taken. In about six weeks the complaints returned, when, as in the last instance, their continuance was very much shortened by the use of the gum.

C A S E VIII.

Mr. Ashwood.---I was not able to ascertain with satisfaction to myself what this patient's complaint really was---he had great shortness of breath, and very considerable difficulty in breathing, particularly on lying down---his pulse beat 110 feeble strokes in a minute---his face was very much pinched in---some degree of œdema in the feet---a short cough, but no expectoration:---All these symptoms strongly indicated water in the thorax; but as no fluctuation was discoverable, and as the symptoms pointed out considerable debility of the system, I directed my attention to the removal of that circumstance:---draughts, with 25 grains of extract, dissolved with mucilage of gum arabic, were given every six hours, and a grain of opium at bed-time. For two days

days there was no alteration for the better---and I apprehended my patient to be in very considerable and immediate danger: the quantity of extract was increased to half a drachm:---on the third morning however, there were symptoms of amendment, and from this time, he continued in a progressive state of recovery. It is remarkable in this case, that all the symptoms gradually subsided without my being able to detect any thing like a critical evacuation, more especially by urine or expectoration. No other medicines were given from the beginning to the end of this case, but the gum in extract, and the opium pill.

C A S E IX.

Mrs. Prescot,---about 50 years old, near three months since was attacked with a very violent cholera; the vomiting
abated

abated, but the purging continued, which in a few hours reduced her amazingly :--- this was treated with opiates and stimulants, which always afforded a temporary but never any permanent relief :---bitters and tonics of various kinds were had recourse to, but without any advantage ; and at the expiration of three months, she was so much reduced by this constant disorder in her bowels, that a favourable change was scarcely to be expected :---the yellow gum was now however, had recourse to, in doses of half a drachm, mixed in plain water---one to be taken twice a day.---I was informed that in two days she was very materially mended, and had a more distinct cessation of her complaint than at any time since she had been taken ill:---from this period her health improved daily, and she has not had any return of the purging since : she took twelve doses

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in six days, and to prevent a return, I directed one to be taken daily for ten days or a fortnight longer.

C A S E X.

-----Merrel, a plumber and painter,--- had been for upwards of a year, subject at times to pains in the bowels and costiveness, but they had usually given way on the use of purging medicines. In December, however, these complaints came on with unusual severity and obstinacy, and they were not in the least altered by the use of a vast variety of purging medicines, and the occasional use of opiates. When he had been in this state a week, I had recourse to the application of cold water to the extremities, which being continued about 15 minutes, produced an immediate and profuse evacuation:--the next morning, however, the pain in the bowels returned, and it did not give way
to

to either glysters or opiates :---one scruple of the gum in powder was therefore given in plain water, every four hours,---he became easy after the first dose, and when he had repeated it three times, he was as well as he had been for some considerable time before.

There is a disorder in the chest---a species of catarrh---which is extremely common among the tide-waiters of the customs at this place: this description of men are from their situation necessarily exposed to every vicissitude of weather, and every irregularity in their mode of living. In whatever manner these circumstances may operate, it is not my business in this place to enquire :---it is only necessary for me here to mention, that on the first attack the air vessels of the lungs appear to

be affected with some degree of inflammation ; but if that viscus is tolerably sound and the constitution not remarkably athletic, the inflammation very seldom terminates in suppuration ; but in two or three days, the symptoms indicating that state, begin to abate, and an expectoration of matter or mucus ensues. There is at this time also a troublesome cough, which is particularly urgent at night so as usually to deprive the patient of rest :— a soreness and weakness of the chest : a pain in the forehead :—very little, if any fever attends ;—and the appetite is tolerably good. If no attention be paid towards the removal of these symptoms, I have found, by experience, that they will continue a very considerable length of time, I have known them often to remain several months, with but little variation. From the general mass of observations,

vations, I am induced to consider the continuance of this complaint, as depending in a very great measure, on a debility of the bronchial glands, or of the innermost membrane of the trachea---and my opinion seems strengthened by the observation that whatever tends to lower, or relax the constitution, invariably does harm; and whatever on the contrary has the effect of encreasing the general strength, very generally does good.

In what way it may act, I will not pretend to say, but I have found in very many instances, that the yellow Gum in tolerably large doses, has, in these cases been productive of very beneficial and powerful effects, inasmuch that those patients who have once taken it, have strongly recommended it to their friends ---and instead of asking my opinion as usual, generally prescribe this medicine

for themselves. That the cure of the complaint does here really depend upon the medicine, and not as in many other cases, upon any spontaneous alteration in the constitution, change in the mode of living, or alteration in the state of the air, is rendered extremely probable in the first instance, by what I have said respecting its continuance where no means for its removal is used---and is evident in the second and third, as they are necessarily obliged to be exposed to every vicissitude of weather; and to live on such kind of diet as chance throws in their way.

Besides these cases, there are many other complaints wherein I found it extremely serviceable, more especially in certain complaints of the stomach and bowels: these complaints were such as arise from a debility, a loss of tone, or a
dimi-

diminished action, in the muscular fibres of that organ, such as loss of appetite, sickness, vomiting, flatulency, heart-burn, pains in the stomach, &c. when they were *really idiopathic* complaints, and not dependent upon any *disease* in the stomach, or affections of other parts of the body communicated to the stomach.

In debilities and relaxations of the bowels, and the symptoms from thence arising, such as purging and flatulency, I have found it of good effect: in certain cases of diarrhœa however, (and it seemed those in which an unusual degree of irritability prevailed,) I think it did not answer so well, unless given in small doses and combined with opiates, when the patient seemed to gain greater advantage, than when opiates only were had recourse to.

In cases of amenorrhœa, depending on (what I believe most of those cases do de-

pend upon)---a sluggishness, a debility, and flaccidity of the system,---this medicine, when assisted by proper exercise and diet, has, by removing the symptoms of dyspepsia, and by restoring the tone and action of the muscular fibres, been found very serviceable.

This medicine does not, in the dose I have been used to give of it, appear to possess any remarkably sensible operation;---it neither vomits, purges, nor binds the belly, nor does it materially increase the secretion of urine or perspiration. It has indeed sometimes been said to purge, and at others to occasion sweating, but they are not constant effects, and when they do occur, depend, I believe, on some accidental circumstance. It should seem to possess in a very extensive degree, the property of allaying morbid
irritation

irritability, and of restoring tone, strength, and action, to the debilitated and relaxed fibre.

When the gum itself was given, it was always the pure unmixed part :---if given in the form of a draught, it was mixed in water with mucilage of gum arabic :---if made into pills, a small portion of Castile soap was employed, as I had found the *lixv. sapon.* dissolved it entirely. It was commonly however made into a tincture by mixing equal parts of the gum and rectified spirit ; one drachm of this tincture (containing half a drachm of the pure gum) made into a draught with water and fyrup, by the assistance of fifteen grains of gum arabic in mucilage, forms an elegant medicine, and at the same time so palatable that I do not recollect an objection being made to it by any one patient.

Once

Once or twice I had used all my pure gum and could not get any fresh supply--- I therefore collected all the small pieces and refuse together, and steeped them in an equal quantity of rectified spirit; after shaking them thoroughly the tincture was strongly pressed through a linen bag:--the tincture was then weighed to ascertain the quantity of gum it contained; or else it was evaporated to nearly a solid consistence, and given in the same manner as the gum itself. In this manner all the gum may be extracted from the very worst specimen: I believe however that the druggists are now in possession of a large quantity of a very good kind: Messrs. Hopkins and Jackson have supplied me with some at the rate of 3s. 6d. per pound,—which one pound with the other yielded 12 ounces of pure unmixed gum; and from the residuum
about

about 3 ounces of extract might be obtained.

Dr. Beugo of Rochester has employed it in a great variety of cases: I am indebted to him for the following information.

‘ It has been found extremely service-
 ‘ able in diarrhœas; and on repeated occa-
 ‘ sions, it has very speedily relieved both
 ‘ the purging and the pain, *when opiates*
 ‘ *had no effect.*

‘ In incipient dysenteries, and in some
 ‘ of long standing, it has proved remark-
 ‘ ably useful: but in inflammatory dysen-
 ‘ teries, it was obliged to be omitted till
 ‘ the inflammation was removed.

‘ In one instance of pains in the bowels,
 ‘ three doses of the tincture (one dram in
 ‘ each dose) *gave more relief than six grains*
 ‘ *of*

‘ of opium: this effect it produced not
 ‘ only once, but on repeated trials.
 ‘ When the gum was given, it brought
 ‘ away large quantities of scybala or
 ‘ knotted fœces, which repeated cathartics
 ‘ both saline and refinous, would not
 ‘ effect:--and this it did without the gum
 ‘ seeming to act as a purgative.

‘ It was given in many complaints of
 ‘ the stomach, both of the spasmodic and
 ‘ dyspeptic kind, that had continued two
 ‘ or three months:---and in so short a
 ‘ time as two or three days, the distur-
 ‘ bances in most of them were materially
 ‘ abated.

‘ In what are called spasms of the sto-
 ‘ mach, it has been found of great use.

‘ In spasmodic complaints of various
 ‘ parts of the body, such more especially
 ‘ as stitches in the side and in the abdomi-
 ‘ nal muscles, attended sometimes with a
 ‘ degree

‘ degree of fever, it has been productive
‘ of considerable service.

‘ In violently excruciating rheumatic
‘ pains, *it has often relieved, when opiates*
‘ *even in large doses* did not procure ease.

‘ In a case of oppression of breathing,
‘ which appeared to arise from debility—
‘ it produced a good effect.

‘ The gum was given in a case of foetid
‘ and ichorous discharge from the vagina,
‘ a fortnight after miscarriage, attended
‘ with a low fever. In two days the dis-
‘ charge was removed, the fever subsided,
‘ and the strength, appetite, and spirits
‘ began to improve.

‘ It has appeared to have a good effect
‘ in fluor albus. In general it has no ef-
‘ fect when fever attends, either in aba-
‘ ting, or encreasing it.

‘ The gum in no instance appeared to
‘ produce any inconvenience, except once
‘ during

‘ during the inflammatory stage of the
 ‘ dysentery.

‘ The mode of administering the gum in
 ‘ the above cases was by infusing two
 ‘ ounces of the gum in one pint of brandy
 ‘ —one dram of this tincture dissolved in
 ‘ mucilage of gum arabic, was the usual
 ‘ doses; and finding that answer so re-
 ‘ markably well, the quantity was not
 ‘ increased.

Mr. Thompson of Rochester has fa-
 voured me with the following cases.

C A S E I.

‘ Mr. Dixon, a gentleman of Ro-
 ‘ chester, was seized with a violent pain
 ‘ in his bowels, attended with vomiting
 ‘ and purging:—his pulse was quick and
 ‘ his tongue dry.—After several hours he
 ‘ ap-

‘ applied for assistance :---he immediately
 ‘ took a draught with ten grains of the
 ‘ gum and repeated it every four or six
 ‘ hours ;---this soon relieved him, and in
 ‘ a few days he got quite well.’

C A S E II.

‘ John Painter was attacked with simi-
 ‘ lar symptoms while he was in a weak
 ‘ and reduced state from a previous illness
 ‘ ---the same quantity of the gum in pow-
 ‘ der was given every four hours, and he
 ‘ soon recovered.

‘ A. B. had the same complaint, dif-
 ‘ fering only in his having a few bloody
 ‘ stools---he took the same medicine---
 ‘ soon found ease, and recovered fast.

‘ In some other similar cases it was
 ‘ given with equal success---from the very
 ‘ beginning of the complaint---but in
 ‘ others it had not that effect, until a vo-
 ‘ mit

‘ mit and some rhubarb had been given---
 ‘ it there appeared to act very powerfully
 ‘ in relieving the purging, and in restor-
 ‘ ing the patient.

‘ Mr. Thompson adds, that ‘ when it
 ‘ is more known he thinks it will be found
 ‘ an useful medicine in what are called
 ‘ bilious cafes, and in dyfenteries:---but
 ‘ that as a great deal of gum is foul and
 ‘ impure---its operation will not always
 ‘ be the same.’

In a second communication with which
 I am favoured by Mr. Thompson, he in-
 forms me of two cafes in which he says,
 ‘ it almost *instantly cured*.’

C A S E III.

‘ Master Anderson applied to me a few
 ‘ days since with a violent pain in his
 ‘ bowels and purging---he could scarcely
 ‘ stand upright:---I gave him one dram
 ‘ and

‘ and an half of the tincture (containing
 ‘ about ten grains of the gum) in an
 ‘ ounce of water, and desired to see him
 ‘ in three hours :---he had had no stool,
 ‘ and the pain was still violent. I repeat-
 ‘ ed the dose :---in three hours more he
 ‘ was almost free from pain—and had one
 ‘ stool :—two doses more quite cured
 ‘ him.’—

C A S E IV.

‘ A pauper at the workhouse had a vi-
 ‘ olent purging, with some pain :—Mr.
 ‘ Smith, my Assistant, saw him and gave
 ‘ him two drams of the tincture, and he
 ‘ was cured :—he has since had natural
 ‘ stools daily.’

The following cases were communicated by Mr. Andrews of Brompton.

C A S E I.

‘ Mrs. Andrews, of a delicate and irritable habit, is frequently troubled with cramp in the extremities ; and when free from it, in those parts, she in general has it in her stomach, attended with griping in the bowels, which almost always terminates in a violent purging ; I have frequently given 100 drops of tincture of opium for a dose, which has *sometimes relieved after 200 or 300 drops had been taken* : Æther joined with camphor, has also *at times* had a good effect in procuring a temporary relief.

‘ In October last the above complaints attacked her violently in her stomach, and bowels, when I had recourse to the
tincture

‘ tincture of opium, æther and camphor,
 ‘ which at first relieved the spasms a little,
 ‘ but did not at all remove the complaint.
 ‘ After continuing those medicines about
 ‘ three days, I determined to try the ef-
 ‘ fect of the yellow gum from Botany
 ‘ Bay:—half a drachm of a tincture, con-
 ‘ taining seven grains of the gum, was
 ‘ united with water by means of mucilage,
 ‘ and was given four times in the
 ‘ day. After taking the above for two
 ‘ days, the spasms and complaint in her
 ‘ bowels were very much relieved; the
 ‘ same medicine was therefore continued
 ‘ for some time after, twice a day, when
 ‘ the complaint seemed perfectly re-
 ‘ moved. However any slight Cold
 ‘ brings on a return of the cramp, which
 ‘ if it attacks the stomach, the bowels
 ‘ are immediately affected, but relief is
 ‘ *always* had from the gum as above.’

C A S E II.

‘ Miss Howe, of a delicate constitution, in October last had a low fever,
 ‘ which she soon got the better of, but
 ‘ was followed by a violent burning pain
 ‘ (as she expressed it) in her stomach,
 ‘ which came on every day about noon,
 ‘ continued the remainder of the day and
 ‘ great part of the night: her appetite
 ‘ was bad and she was generally worse after
 ‘ taking any kind of nourishment. I
 ‘ gave her a strong infusion of Cort. St.
 ‘ Lucia, to be taken every four hours, and
 ‘ every third day an opening draught with
 ‘ rhubarb, which plan was followed for
 ‘ twelve days, when finding I gained no
 ‘ ground, I determined to try the effects
 ‘ of the gum from Botany Bay, which I
 ‘ gave in the proportion as mentioned in
 ‘ the other case; on the second day she
 ‘ found

‘ found great relief, and continuing it for
 ‘ about one week, the complaint was en-
 ‘ tirely removed, and she had no return
 ‘ of it since.

‘ Her pulse was low, but regular, till
 ‘ after taking the gum, when it rose to
 ‘ it’s usual state ; her bowels were not af-
 ‘ fected, but she found a pleasing warmth
 ‘ in her stomach after taking the medi-
 ‘ cine.’

The following Cases were communi-
 cated, by Mr. Harris of Gravesend.

C A S E I.

‘ S. B——k, aged 20, subject to a ner-
 ‘ vous disease, complained to me on the
 ‘ 29th of October last, of violent pain
 ‘ about the Pylorus, attended with vo-
 ‘ mitings, particularly after taking the
 ‘ smallest quantity of nourishment; her

‘ spirits were much dejected and her
 ‘ pulse low, and quick. I ordered a large
 ‘ blister to be applied to the stomach, and
 ‘ from one drachm to two drachms of
 ‘ æther every hour till better, this had not
 ‘ the desired effect; although more than
 ‘ an ounce was taken, it only afforded
 ‘ short intervals of ease.—30th. The
 ‘ blister had risen well, she had had no
 ‘ rest. The pains were still violent; vo-
 ‘ mitings continued and the pulse and
 ‘ spirits were lower; I then ordered her
 ‘ small doses of Tinctura Opii, joined
 ‘ with stimulants, the Infus. Ligni Quas.
 ‘ and other bitters were given, but with no
 ‘ better effect; I then gave her one
 ‘ drachm of the tincture of the yellow
 ‘ gum from Botany Bay; dissolved in
 ‘ mucilage of gum arabic, every three
 ‘ hours. *The first draught gave her im-*
 ‘ *mediate relief and stopped the vomitings;*
 ‘ and

‘ and the second dose removed the pain entirely; I then desired the draughts to be continued two days, one every eight hours, and she has not had the smallest return of her complaints since.’

C A S E II.

‘ Mrs. W——d aged 26, and Mrs. F——n aged 24, both subject to nervous disorders, complained on the 31st of October last, of the same symptoms as were mentioned in the preceding Case: I gave them immediately the tincture of the yellow gum and they soon recovered.’

C A S E III.

‘ I was sent for the 3d of November to Mrs. Farmer’s son, 4 years old, of a very weak and delicate habit,—with general debility, particularly of the stomach,

O 4

‘ mach, which would not retain any kind
 ‘ of nourishment—it being immediately
 ‘ rejected. I gave him half a drachm of
 ‘ the tincture dissolved as above, which
 ‘ stopped the vomitings in 24 hours, and
 ‘ the stomach was enabled to retain its
 ‘ usual food. The medicine was conti-
 ‘ nued only three days.’

CASES. IV. V. VI. VII.

‘ Mrs. W——t, aged 57, of a dropsi-
 ‘ cal habit, applied to me the sixth of
 ‘ November last, with vomitings but
 ‘ without pain.’

‘ Miss G——e, aged 20, of a delicate
 ‘ habit, the 22d. of November com-
 ‘ plained of reachings, particularly in the
 ‘ morning with pain.’

‘ Mrs. A——d, aged 32, of a delicate
 ‘ habit, the 6th of December complained
 ‘ of sickness, with loss of appetite and rest.’

‘ Mrs.

‘ Mrs. T-----r, aged 32, of a delicate,
 ‘ constitution, the 8th of December com-
 ‘ plained of being very languid ; she had
 ‘ a nausea, and loss of appetite, her spi-
 ‘ rits were much dejected and her pulse
 ‘ low and quick.

‘ The gum given as above directed, in
 ‘ a few days removed their complaints,
 ‘ and restored their healths, spirits, and
 ‘ appetite : except Mrs. W-----t, and to
 ‘ her it always afforded a temporary relief
 ‘ to the vomitings ; but she lately died
 ‘ of a dropfy of the chest.’

C A S E VIII.

‘ Mrs. E-----n, aged 35, complained
 ‘ to me the 6th of December of a quartan
 ‘ fever, attended with loss of appetite,
 ‘ and violent reachings so that her stomach
 ‘ would not bear the cort. Peruv. or any
 ‘ of its preparations ; the saline draughts
 ‘ there-

‘ therefore in a state of effervescence, opi-
 ‘ ates, cardiacs, preparation of lignum
 ‘ quassia, and other stomachic bitters
 ‘ were given, but without any good ef-
 ‘ fect ; nor did the tincture of the yellow
 ‘ gum dissolved with mucilage answer
 ‘ here so well as expected ; I therefore
 ‘ ordered one tea-spoonful of the tincture
 ‘ to be taken alone, when she found her-
 ‘ self sick, since which time the sickness
 ‘ and nausea have been effectually re-
 ‘ moved, and the stomach now retains an
 ‘ infusion of the cort. angustur. without
 ‘ the least uneasiness.’

C A S E IX.

‘ Mrs. M-----n, aged 28, very much
 ‘ afflicted with rheumatism, complained
 ‘ on the 20th of December, of pain in the
 ‘ stomach which was so violent that the
 ‘ neighbourhood was alarmed with her
 ‘ cries :

‘ cries : I gave her one drachm of the
 ‘ tincture dissolved at first which abated
 ‘ the pain ; and some time after I gave
 ‘ one drachm of the tincture alone, and
 ‘ *it immediately carried it off* ; she has had
 ‘ another return of the pain since, at-
 ‘ tended with a greater degree of flatu-
 ‘ lency, when I gave a dose of the tinc-
 ‘ ture, with as good success as before.’

C A S E X.

‘ Miss S. O-----m, aged 17, of a deli-
 ‘ cate constitution, complained the 6th of
 ‘ December of a very acute gnawing pain
 ‘ in her stomach, with sickness and at
 ‘ times a difficulty of respiration. I first
 ‘ ordered the tincture dissolved, which
 ‘ was taken for four days successively, and
 ‘ only afforded a temporary cessation of
 ‘ pain, for about an hour, when it ge-
 ‘ nerally returned:---I then desired one
 ‘ drachm

‘ drachm or more of æther to be taken
 ‘ every five hours, and that being con-
 ‘ tinued for three days, and not even
 ‘ giving so much relief as the former me-
 ‘ dicine, I determined to give one drachm
 ‘ of the tincture alone, which *immediately*
 ‘ *released my patient from her pain.* The
 ‘ medicine has been continued every day
 ‘ since.’

C A S E XI.

‘ Mrs. P-----n, aged 40, very much
 ‘ afflicted with the gout. She had had pains
 ‘ in the extremities for some weeks past :
 ‘ ---on the 20th of December I was sent
 ‘ for, when I found her almost distracted
 ‘ with pain in her stomach, during which
 ‘ time she could not feel those in the ex-
 ‘ tremities which she before complained
 ‘ of : I gave her the tincture of the yellow
 ‘ gum dissolved ; The first dose abated the
 ‘ pain for half an hour, when it returned
 ‘ I gave

‘ I gave a second dose which released her
 ‘ for two hours and a half : I gave a third
 ‘ dose, which again gave ease but it was
 ‘ only for half an hour : finding the last
 ‘ intermission of so short duration, and
 ‘ her respiration becoming very quick, I
 ‘ gave her two drachms of æther, and re-
 ‘ peated it three times in the space of an
 ‘ hour, without its affording any relief.
 ‘ I had every reason to expect I should
 ‘ have lost my patient, as her pulse and
 ‘ spirits began to sink very fast, and the
 ‘ extremities were covered with a cold,
 ‘ clammy sweat ; I then gave one dram
 ‘ of the tincture *alone, which instantane-*
 ‘ *ously removed the pain from her stomach,*
 ‘ and it has not been felt there since; only
 ‘ in the extremities as at first, and now
 ‘ gets better every day.

‘The

‘ The tincture was made by mixing
 ‘ equal parts of the pure gum and recti-
 ‘ fied spirit. One drachm of this was
 ‘ the usual dose.’

Mr. Bowes the Surgeon of the Lady Penrhyn transport from Botany Bay, assured me, he had seen it produce very good effects in various instances of debility in the stomach and bowels, when given in doses of fifteen grains or a scruple.

The chief mate of the Lady Penrhyn, informed me, that in his voyage home, he had been very much troubled with a nausea and sickness of stomach : and it was attended regularly every morning after breakfast, with vomiting :—Having
 in

in many instances witnessed the good effects of the yellow gum in stomach complaints, he was induced to take some of it himself: he did so, and the complaint immediately left him.

In Philips's Voyage to Botany Bay, its effects are thus spoken of ;--' In the dysentery, the red gum* of the tree which principally abound on this coast, was found a very powerful remedy. The yellow gum has been found to possess the same property, but in an inferior degree. p. 59.

* This is said to be ' drawn from the tree by tapping, or taking out of the veins of the wood when dry.' It appears to me, and I have no doubt from the specimens I have seen, it really is the gum rubrum astringens. I transmit a small portion to the society, who will be the better judge.

' We

‘We are informed by Dr. Blane, physician to St. Thomas’s Hospital, that he has found it remarkably efficacious in the cure of old fluxes, and this not only in a few instances, but in many obstinate cases.’ p. 294.

As the yellow gum, the subject of the present paper, must be in a great measure unknown to the generality of practitioners, it having been but very lately introduced into this kingdom, I have thought it necessary to produce before the society, as large a collection of facts respecting it, as I have been able to procure in the short space of time that it has come under my observation ; and I have been more particular in the relation of its effects, as no account of its medicinal properties has yet been made public.

From

From what has been said respecting its effects, I cannot entertain a doubt that it will be found a very useful acquisition to the medical practitioner ; and in this opinion I am confirmed by the concurrent testimony of every one of my acquaintance who has employed it. It is not to be expected, that I can yet have had an experience of its effects, sufficiently extensive, to enable me to point out with confidence, all the diseases in which it is most likely to succeed: I will for the present therefore content myself with observing, that independent of the complaints in which it is here related to have succeeded, such as, nausea, sickness, vomiting, flatulency, heartburn, pains in the stomach, and all the other symptoms of dyspepsia,—Diarrhœa, mild degrees of cholera, and dysentery, pain in the bowels, spasms, in the stomach, in the muscles of the trunk,

P and

and in those of the extremities, the gout in the stomach, and violent pains in the extremities resembling the gout or rheumatism,---catarrhus affections,---and in certain cases of amenorrhœa and fluor albus.---Exclusive of these complaints I say, in all cases where debility itself is the idiopathic complaint, where it is independent of, and unconnected with any real organic disease---I should expect whether the affection be local or general, that the yellow gum will be found a very powerful and effectual restorative. In what other cases beside those already mentioned, it may be likely to answer, I will not take upon myself, at this time to say; but from what has here been stated respecting its general effects, every one will be able to form the opinion for himself.

January 1st, 1790.

CASES OF SEVERAL WOMEN
WHO HAD THE
SMALL-POX DURING PREGNANCY;
WITH AN
ACCOUNT OF THE MANNER
IN WHICH THE
CHILDREN APPEARED TO HAVE BEEN AFFECTED.

AS the most eminent phyfiologists are unfettled in their opinion respecting the operation of the small-pox on the fœtus in utero, and as but a small number of cafes have been publifhed of women who have undergone that difeafe during pregnancy, I apprehended the relation of a few instances, which occurred under my own immediate obfervation, and likewise of fome which were communicated to me, will not be unacceptable; and as nothing can be more effentially

necessary for the elucidation of real circumstances, than a large collection of facts, I have subjoined a concise account of all those cases which have occurred in the course of my reading.

Cases of Children which are said to have been infected with the Small-Pox in Utero.

Mr. Wood, Surgeon to the General Hospital in Chatham Barracks, communicated the following.

CASE I.

“SEVERAL years since, when the Essex militia were in Chatham Barracks, I was called to see a woman who was dead of the small-pox: on my arrival I found the woman had been dead somewhat above two hours:—the small-pox were
of

of the confluent kind, and they appeared to be about the turn. She was in the ninth month of her pregnancy, and as no doubt could be entertained of her death, I opened the abdomen and uterus, with the view of saving the child. The child however was dead; but it had numerous pustules all over the face, body, and extremities, which in my opinion were most evidently and undoubtedly variolous eruptions. The pustules appeared of the same size, as they usually are about the fourth or fifth day."

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Mr. Andrews, of Brompton, communicated the following letter from Mr. Robert Sargeant, of Plymouth.

CASE II.

“ ON the 6th day of December 1782, I inoculated Mrs. Lay, of Plymouth, for the small-pox, who was (unknown to me) in the seventh month of her pregnancy. She had the disease favourably, and was delivered of a boy on the sixth of January following, who had pustules diffused all over his body. The pustules were very numerous, and exactly resembled variolous eruptions which were in an early stage of maturation; and they appeared to advance until his death, which happened two days after.”

Mr. Sargeant concludes his letter by observing, “ I have no more doubt that the eruptions were varicelous than I have of my own existence,”

Mr,

Mr. Derham relates, that a woman with child being pretty well recovered from a mild sort of the small-pox, on the 3d of September took a purge, which worked so violently, that she fell into faintings and convulsions. She was not delivered till the 8th of September. The child appeared to the midwife to have been dead five or six days: its belly was burst, the bowels came out, and the whole body tended to putrefaction. The child was so very full of the small-pox, that hardly a pin's head could be put between the blisters, which were very plump and full of matter, like the pustules of an adult, when the small-pox are

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at the height, only a little depressed in the middle.

Ph. Tr. 337. p. 165.

BARTHOLIN affirms, as an eye witness, that a poor woman, ill of the small-pox, was delivered of a child, whose tender body had as many pocks on it as the mothers, and who died soon after the birth, as the mother herself did, three days after of the disorder.

Van. Swieten, XV. p. 16.

A WOMAN, big with child, having herself long ago had the small-pox, very assiduouſly nurſed a maid ſervant during
the

the whole process of this disease. At the proper time she brought forth a healthy female child, in whose skin Dr. Watson asserted that he discovered evident marks of the small-pox, which she must have gone through in the womb: and the same physician pronounced that this child would be free from future infection. After four years her brother was inoculated: and Dr. Watson obtained permission of the parents to try the same experiment on the girl. The operation was performed on both children in the same manner, and the pus used in both cases was taken from the same patient. The event however was different: for the boy had the regular eruption and got well; but the girl's did not inflame or suppurate. On the tenth day from the insertion of the matter, she turned pale suddenly, was languid for two days, and afterwards

was

was very well. In the neighbourhood of the incision there appeared a pustule, like those pustules that we sometimes observe in persons, who, having had the disease, attend patients ill of the small-pox."

Ph. Tr. V. 46. p. 235.

MAURICEAU affirms, that he had heard his father and mother often say, that he came into the world with five or six pocks upon him : it seems a brother of his, six years old, whom his mother anxiously attended day and night, during the small-pox, had died of it on the seventh day, and our author was born the next.

Van Swieten, XV. p. 17.

Dr. MEAD says, when a woman in the small-pox suffers abortion, the child most commonly comes into the world with the distemper upon it, but not always. When it does not, the disease generally breaks out a few days after delivery: in proof of which he mentions the following case.

“ A lady of quality was, in the seventh month of her pregnancy, seized with so malignant a sort of the confluent small-pox, that there was no appearance of any one favourable symptom. In this condition she was, on the eleventh day of the distemper, delivered of a son, who brought no marks of the infection into the world, and she died on the fourteenth day. But, in the morning of the fourth day following, the infant was seized with convulsions, the forerunners of the eruption,

tion, which appeared the same day, and he died in the evening."

"But in case there is no miscarriage, the child will be free from the disease during his whole life, unless he happens to be born before the pustules were come to maturity.

"The infant in the womb sometimes catches the distemper, without the mother being affected, as I shall prove by this remarkable instance which I well remember."

"A CERTAIN woman, who had formerly had the small-pox and was now near her reckoning, attended her husband in the distemper. She went her full time, and was delivered of a dead child. It may be needless to observe, that she did not catch it on this occasion, but the dead body of the infant was a horrid sight, being all covered with the pustules:
a mani-

a manifest sign that it died of the disease before it was brought into the world."

Mead's Works, 8vo. 252. and 253.

MRS. FORD, who looked upon herself in the sixth month of her pregnancy, on the 5th of December was seized with the eruptive fever of the small-pox. On the eighth they appeared, proved of a mild kind, moderate in quantity, and she passed through the disease in great spirits. On the 31st of December she was delivered, that is, twenty-three days after the appearance of the eruptions. The body of the child was covered with an eruption, and several of the pustules were filled with matter. Dr. Hunter, Dr. Leake, Mr. John Hunter, Mr. Cruickshanks, and Mr. Falconer, all concurred

curred in opinion that the eruption on the child was the small-pox.

Ph. Tr. V. 70. p. 28.

MR. HUNTER having paid particular attention to this case, I shall subjoin some of his reflections upon it.

In the first place, he observes "there can be no doubt but the mother had the small-pox, and that it went through its regular stages."

"Secondly, the distance of time when she had the small-pox before delivery, joined with the stage of the disease in which the child was born, perfectly agrees with the possibility of the infection being caught from the mother.

"Thirdly, the external appearance of the pustules was perfectly that of the small-pox."

Not

Not satisfied with these leading circumstances, and external appearances being so much in favour of their being the variolous eruption, Mr. Hunter observes, “ they were not an absolute proof of its being the genuine small-pox ”—he therefore proceeds to investigate “ how far all the circumstances correspond or are similar to the true small-pox.”

He observes, that in the present case we can have no positive information respecting this child having the fever which precedes the small-pox—or the progress and declension of the eruption, which in the small-pox is pretty regular, although both are presumable ; but even these, he justly observes, are not absolute proofs of the small-pox.

After mentioning these uncertain signs, he states what he conceives to be the pure characteristic of the small-pox,

Q which

which is—“ *the formation of a slough, or a part becoming dead by the variolous inflammation.*”

Applying this to the case under consideration, Mr. Hunter observes—“ In the present case, besides the leading circumstances, mentioned in the case of the mother, corresponding with the appearances of the child, and the external appearances themselves, we have in the fullest sense the third and real, or principal character of the small-pox, viz. the slough in every pustule; from all which I think we may conclude, that the child had caught the small-pox in the womb; or at least, a disease, the effects of which were similar to no other known disease.”

As Mr. Hunter, in opening the bodies of those who had either died of, or died while under the small-pox, had always examined carefully to see whether any internal cavity, such as the *œsophagus*,
trachea,

trachea, stomach, intestines, *pleura*, *pæritonæum*, &c. had eruptions upon them or not, and never finding any in any of those cavities, he saw the most favourable opportunity of clearing up this point in the present case. He therefore very attentively examined most of the internal cavities of this child, “but observed nothing uncommon.” In this respect likewise, therefore, the present case exactly agrees with the true small-pox.

DR. WRIGHT relates the case of a negro woman, about twenty-two years of age, and big with child. The eruptive fever was slight, the small-pox were few, distinct, and large, and she went through the disease with very little trouble, till on the fourteenth day from the

Q 2 eruption,

eruption, she was attacked with a fever, which lasted only a few hours. She was however taken in labour the same day, and delivered of a female child, with the small-pox on her whole body, head, and extremities. They were distinct and very large, such as they commonly appear on the eighth or ninth day in favourable cases. The infant died the third day after she was born.

Ph. Tr. V.

A WOMAN who had been inoculated, had a child born nine weeks after inoculation, at the full time, with distinct marks of the disease, though the mother had very few eruptions.

Dimisdale's Present Method of Inoculation, p. 22.

DR.

DR. BLAND relates, from the authority of a midwife on whom he can depend, that in July 1781, Mary Gatton, of Princes-street, Westminster, was attacked with the small-pox. She was then in the seventh month of her pregnancy. The disease proved to be of the confluent kind, and was attended with considerable fever. Six days after the turn of the pock, or about eighteen from the first attack of the eruptive fever, she was taken in labour and delivered of a child which seemed to have been dead five or six days. Its body was covered with confluent small-pox. The pustules were white and full of matter, and, from their size, seemed nearly to have attained their maturity.

Medical Journal, V. 2. p. 205.

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MR. ROBERTS inoculated Mary Sticks, near the ninth month of her pregnancy, on the 14th of November 1783. On the 21st the eruptive fever commenced, and the small-pox, which was not very numerous, came out the third, on the 28th she fell into labour, and on the 29th was delivered of a dead child. The body of the child was covered with the small-pox, the bases of which were in a gangrenous state.

Medical Journal, V. 5. p. 400.

MR. JENNER inoculated "Jane Parker, aged 27, on the 25th of May 1785, being then in the eighth month of her pregnancy. On the 1st of June the eruptive fever commenced. The eruptions

tions (few in number) appeared on the third day. She recovered and went about her business as usual. On the 18th of July she felt symptoms that convinced me the child was dead, and on the 23d, she was delivered of a dead child, with about thirty large pustules on its body, the bases of which were in a gangrenous state."

Medical Journal, V. 7. p. 165.

MRS. EVE, then in the eighth month of her pregnancy, was seized with the small-pox, the pustules were distinct, yet uncommonly numerous. On the eleventh day they began to turn; and on the twenty-second day her labour took place, which, according to her reckoning, was a fortnight before the regular period.

Q 4

The

The child at the time of its birth was covered with distinct pustules all over the body: they did not appear to be full of matter till three days after; at which time some pus was taken on a lancet, with which a child was on the 2d of December, inoculated on both arms.

The arms inflamed, and the 11th of December the child sickened, and was affected with all the symptoms which usually precede the eruption. On the 12th the sickness and fever abated, the pustules of the distinct sort of small-pox made their appearance, and the child having regularly gone through the several stages of the distemper, was perfectly well in three weeks.

Mr. Lynn thinks it proper to observe that Mr. Findlay and Mr. Holladay, surgeons, were present both at the taking of
the

the matter and at the subsequent inoculation of the child.

Singular Case of a lady, by W. Lynn.

Cases in which it appears the Children were not infected with the Small-Pox in Utero.

C A S E I.

MRS. SQUIRES, of Northfleet, in the last month of her pregnancy in the year 1780, was on the Thursday or Friday taken with fever and its usual attendants: on the Saturday she was delivered. About two hours after delivery the small-pox appeared;—was very full of the coherent kind. She died on the Friday.

The

The child died the Tuesday week following, having lived nine days : it died unexpectedly. How long it was ill, or in what manner it was affected, I was not able to learn ; all the persons, however, who were present, agree that there was not the least appearance of any eruption : it is not impossible, however, but it might have died in one of those fits which frequently precede the eruption of the small-pox.

C A S E II.

MRS. CLIFTON, of the parish of Northfleet, sometime in the year 1781, was seized with a very mild sort of the small-pox, in the seventh month of her pregnancy. She was delivered at the usual time, and the child was very healthy,

thy, it had a few small spots on it, but the midwife, who attended, said they had not the least resemblance to the small-pox.

This child I inoculated in May 1786; every stage of the disease was distinctly marked. It had about twenty pustules. One or two children inoculated with matter from his arm, was infected as usual.

C A S E III.

MRS. LEE, of the parish of Northfleet, in the eighth month of her pregnancy, was in July 1780 attacked with the small-pox: she had the eruption [extremely full, and nearly as bad as I ever remember to have seen; she however recovered, but it accelerated her delivery about a month. There was not the least appearance

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ance of the small-pox or any other eruption on the child.

This girl I inoculated in November 1787; she had about twenty eruptions, but being of a delicate constitution, and having lived too low, they did not suppurate; the arm however had quite the usual appearance.

C A S E IV.

I am informed by Mr. Thompson of Rochester, that he attended a lady in the distinct small-pox, who was about five months advanced in her pregnancy. The child was inoculated some time after delivery, and had the small pox*.

A L A D Y

* It may not be improper to make mention of the following fact. Mrs. Colyer, of Southfleet, had the *measles* just one week before she was delivered of a daughter,

A LADY of quality, whom Boerhaave had attended with good success, in a very bad and confluent small-pox, and, in the sixth month of her pregnancy, was delivered when her time was up, of a healthy boy, on whom not the least trace of the disorder could be found.

Van Swieten, Vol. XV. p. 17.

A WOMAN was taken ill of the small-pox, in the fourth month of her pregnancy. This infant had no appearance of the disease when born, and it was generally expected she never would have it; but some years after the measles were very frequent, and she, among many others, contracted the disease.

nancy,

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nancy, from which she apparently narrowly escaped, and, when her time was out, was delivered of a healthy and pretty stout boy, on which there is no mention made of any eruptions, or marks of them having appeared.

Van Swieten, Vol. XV. p. 212.

“ A WOMAN was delivered of a male child at the ordinary time, herself as well as the infant being in good health, notwithstanding that, in the fifth month of her pregnancy, she had the small-pox in a severe manner, of which disease, however, there did not appear on the body of the child, any mark which could testify,

tify, that he had been infected in the womb.”

Mauriceau's Obser. 576, or Medic. Tr. Vol. II. p. 317.

SIR G. BAKER relates, that—“ Two pregnant women having been inoculated, had the small-pox in a very favourable manner, and afterwards brought forth their children perfectly healthy at the usual time. Both these children, when they had attained the age of about three years, were inoculated *with effect*, and had a moderate eruption.”

Medical Transactions, Vol. II. p. 314.

SIR

SIR G. BAKER mentions a case which fell under the observation of Dr. Clarke of Epsom. “ A woman, towards the end of her pregnancy, had the small pox, from which she narrowly escaped. Five weeks after the crisis, she was delivered of a healthy female child, who having numerous marks on her skin, was judged, by all who saw her, to have undergone the same distemper before her birth. However, at the end of twelve months, she had the small-pox in a very severe manner. Both the mother and child were lately living at Epsom.

Mr. Hunter's Paper, Phil. Tr.

“ DR. HUNTER thought the eruption so like the small-pox, that he could hardly
doubt ;

doubt ; but said that, in all other cases of the same kind, that he had met with, *the child in utero had escaped the infection.*”

Mr. Hunter's Account, Ph. Tr. Vol. LXX.

“THE infection from an infected mother is conceivable and * common enough”—yet no particular case is brought forward in support of this opinion. In a note, however, he, says * “yet this is not constantly the case—an ingenious anatomist lately assured me, he opened the body of a woman, far advanced in her pregnancy, who died of the small-pox, without imparting the least visible infection to her fruit.”

Kirkpatrick. p. 21.

R

DR.

DR. DIMSDALE has since his first publication, seen instances in which two pregnant women were inoculated, and each had a plentiful eruption of the small-pox: three or four years afterwards he inoculated the children, and both had a tolerable number of pustules.

Dimsdale's Tracts on Inoculation, or Med. Journal.
vol. II. page 157.

MR. ROBERTS relates that Eliz. Boon, in the eighth month of her pregnancy, was inoculated on the 15th of November, 1784. On the 20th the eruption appeared, and the fever did not abate. On the

the 27th her pains came on, and she was in a few hours delivered of a living child. There was not the least trace of eruptions on any part of the body of the child, which died in about ten days, with a complaint in its bowels.

Medical Journal, Vol. V. page 400.

MARY JEFFRY, in the eighth month of her pregnancy, was inoculated on the same day with Eliz. Boon; she passed through all the stages of the disease, with as little disturbance as any person I ever saw: and, three weeks afterwards, was delivered of a living child, without any appearance of the disease upon it.

The same.

MR. JENNER relates that Mary Ellis, aged 42, in the ninth month of her pregnancy, was inoculated May 25th, 1785. On the 1st of June the eruptive fever came on, together with pains, resembling those of labour. She had few eruptions, and did well. On the 10th of June she fell down stairs: this accident brought on labour, and she was delivered of a dead child, which had no appearance of eruption on any part of its body.

(It should seem that this child might have died before it could have received the infection, or at least before the eruptions could have made their appearance.)

Medical Journal, Vol. VII. page 165.

REBECCA GILL, in the ninth month of pregnancy, was inoculated June 6th. On the 13th the eruptive fever commenced, and on the 16th the eruption appeared. On the 18th she was delivered of a living child, without any appearance of disease upon it.

The same.

M. TWINING, aged 38, was inoculated July 1st. in the fifth month of her pregnancy; she had the disease favourably, was delivered of a living child, at the end of the ninth month, without any appearance of disease upon it.

The same,

THAT the animal œconomy should not observe precisely the same law, under the same circumstances, has excited the surprize of many attentive observers: much might be added to what has already been written on this interesting subject, at present, however, I shall content myself with stating a few circumstances that occurred under my own observation, which, although they do not by any means entirely clear up the difficulty, yet I am of opinion, may assist in explaining why a woman, in the small-pox, so seldom communicates the infection to the foetus in utero.

Some time since, I had occasion frequently to observe, that *very young children* had been repeatedly inoculated, and
for

for several weeks constantly exposed to the worst kind of natural small-pox, without any effect. Soon after, the measles became unusually rife, of a putrid nature, and much more contagious than I ever observed them before or since: here again I attended in several families, where the *young infants* (particularly when under two months) were the *only* part of the family that escaped the disease, although exposed, a considerable time to the infectious air, and lying all the night close to other children passing through every stage of the complaint, and, consequently, perpetually inhaling into their lungs the very essence of infection; nay, I have been informed of more than one instance, where, in addition, the mother had the disease, and the child, (although constantly in her arms, breathing the air from her lungs reeking with putrid par-

ticles, and sucking the milk, impregnated strongly, as we should think, with the disease,) has for some months withstood the infection !

The perpetual repetition of what I have just related, very much surpris'd me, and the subject of this paper being about that time much in my mind, I was struck with the similitude of the circumstances, and concluded, that nature, for the best and wisest purposes, had ordained, that very young infants should be so *extremely unsusceptible* of these diseases, which occasion such havock among those who are older, even when they seem to have the advantage on their side of health, strength and a vigorous constitution. To me I acknowledge, the appearances in favour of such an idea are very strong ; but whether this is really the case, and whether others have observed the same general exemption

CASES of CHILDREN which are said to have been INFECTED with SMALL-POX in UTERO.

By whom related, and where.	Period of Pregnancy.	Natural or Inoculated.	Degree of Difease.	Interval between 1st of Erup. Fever and Delivery.	Degree of Difeafe in the Child.	State the Child was born in.
Mr. Wood.	9 month.	natural.	the woman was dead, but the child was ex-tracted by the cæfarian operation.		very numerous.	dead.
Mr. Sergeant.	7 month.	inoculated.	favourable.	21 days.	disperfed all over the body.	alive.
Mr. Derham, Ph. Tr. 337. p. 165.		natural.	mild.	about 20 days.	extremely full.	dead.
Van Swieten, vol. 15. page 16.		natural.			extremely full.	alive.
Dr. Watfon, Ph. Tr. vol. 46. p. 235.		the woman had had the difeafe.			evident marks.	alive.
Van Swieten, vol. 15. page 17.					4 or 5 pocks.	alive.
Dr. Mead's Works, page 252.	7 month.	natural.	extremely bad.	about 14 days.	the child was feized with the erup-tion four days after birth.	
Dr. Mead's Works, page 253.	about 7 months.	the woman had had the difeafe.		about 2 months.	extremely full.	dead.
Mr. Hunter, Ph. Tr. vol. 70, p. 28.	6 month.	natural.	mild.	26 days.	very full.	dead.
Dr. Wright, Ph. Tr.		natural.	mild.	17 days.	full.	alive.
Dr. Dimfdale, 1st Treatife, p. 22.	about 7 months.	inoculated.	mild.	9 weeks.	diffinct.	
Dr. Bland, Med. Journ. v. 2. p. 205.	7 month.	natural.	confluent.	18 days.	confluent.	dead.
Mr. Roberts, Med. Journ. v. 5. p. 400.	9 month.	inoculated.	mild.	8 days.	confluent.	dead.
Mr. Jenner, Med. Journ. v. 7. p. 165.	8 month.	inoculated.	mild.	7 weeks.	diffinct.	dead.
Mr. Lynn, Singular cafe of a lady.	8 month.	natural.	uncommonly nu-merous.	25 days.	covered all over the body.	alive.

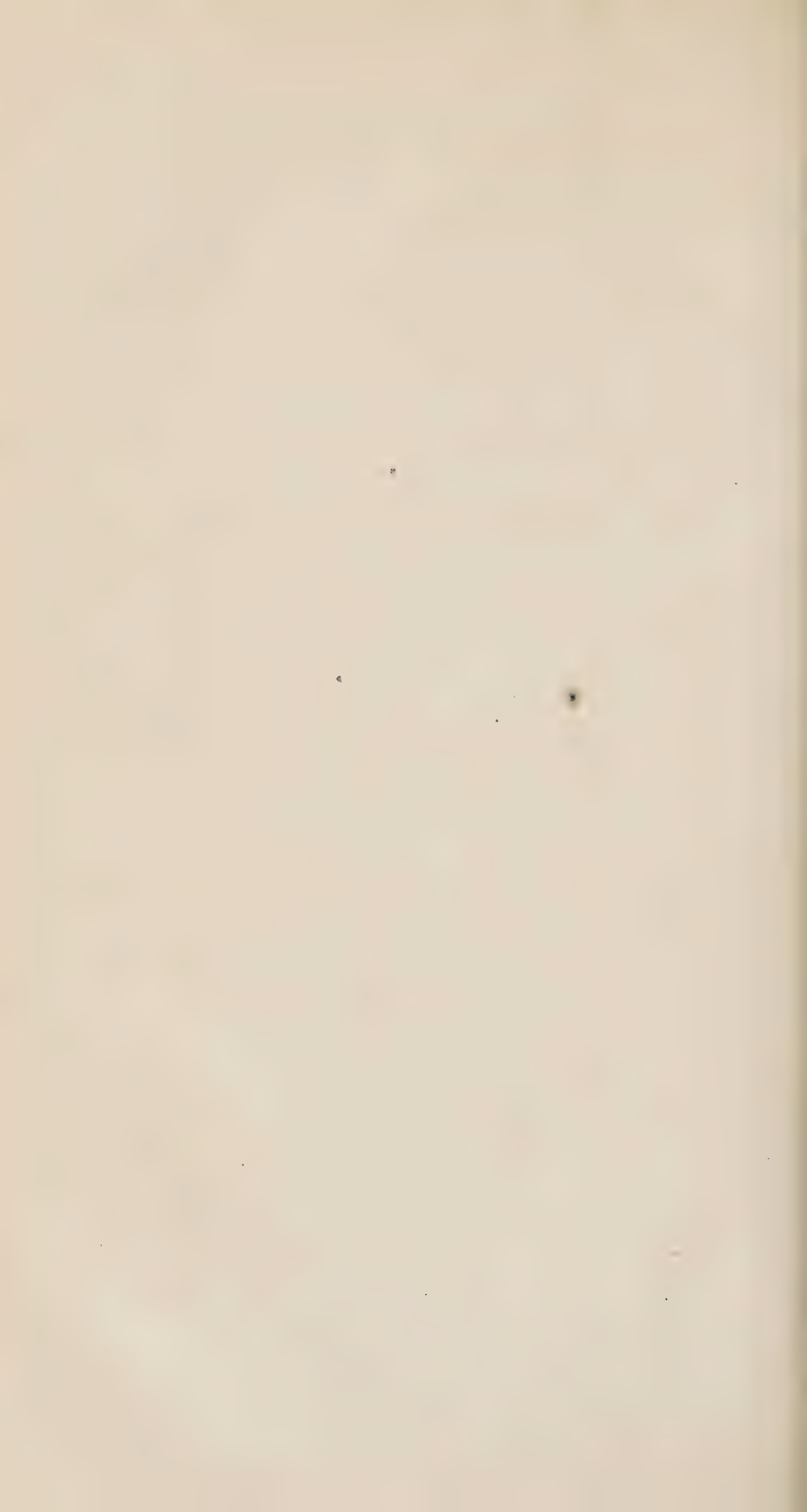
CASES in which it appears the CHILDREN were NOT INFECTED with the SMALL-POX in UTERO.

By whom related, and where.	Period of Preg-nancy.	Natural or Ino-culated.	Degree of Dif-eafe.	Interval between 1st of Erup. Fever and Delivery.	State in which the Child was born.	Event of Inocu-lation.
Mr. Kite.	9 month.	natural.	confluent.	3 days.	alive.	died 9th day.
Mr. Kite.	7 month.	natural.	very mild.	7 weeks.	alive.	fuceeded.
Mr. Kite.	8 month.	natural.	confluent.	1 month.	alive.	fuceeded.
Mr. Thompfon.	5 month.	natural.	diffinct.	4 months.	alive.	fuceeded.
Van Swieten, vol. 15. page 17.	6 month.	natural.	confluent.	3 months.	alive.	
Van Swieten, vol. 15. page 212.	4 month.	natural.	fevere.	5 months.	alive.	
Mauriceau's Obfer. 576.	5 month.	natural.	fevere.	4 months.		
Sir G. Baker's Med. Tr. v. 2. p. 314.		inoculated.	favourably.		alive.	fuceeded.
Sir G. Baker's Med. Tr. v. 2. p. 314.		inoculated.	favourably.		alive.	fuceeded.
Mr. Hunter, Ph. Tr. vol. 70.	about 8 months.		fevere.	6 weeks.	alive.	had the natural S.P. in fevere man.
Dr. Dimfdale's Tracts.		inoculated.	plentiful eruption.		alive.	fuceeded.
Dr. Dimfdale's Tracts.		inoculated.	plentiful eruption.		alive.	fuceeded.
Mr. Roberts, Med. Journ. v. 5. p. 400.	8 month.	inoculated.	diffinct.	10 days.	alive.	died 10 days.
Mr. Roberts, Med. Journ. v. 5. p. 400.	8 month.	inoculated.	mild.	4 weeks.	alive.	
Mr. Jenner, Med. Journ. v. 7. p. 165.	9 month.	inoculated.	mild.	9 days.	dead.	
Mr. Jenner, Med. Journ. v. 7. p. 165.	9 month.	inoculated.	mild.	5 days.	alive.	
Mr. Jenner, Med. Journ. v. 7. p. 165.	5 month.	inoculated.	mild.	4 months.	alive.	

emption of very young infants, future observation may determine ; if, however, it should generally be found to be so, it may, upon the same principle (that is, the younger, the weaker the infant is, the less of life it possesses, the less susceptibility it has also for these complaints) be explained, why the foetus in utero so seldom is affected with the small-pox.

Nov. 9th, 1792.





AN ACCOUNT
OF SOME
ANOMALOUS APPEARANCES
CONSEQUENT TO
THE INOCULATION OF THE SMALL-POX.

C A S E I.

MISS Cruden and Miss Henrietta Cruden were inoculated on the 19th of May 1787, with fresh matter from some children who were said by a surgeon of this place to have passed through the disorder in the usual manner.

2d. day.---The incisions were somewhat inflamed.

4th.---The inflammation increased---it was more considerable on the arm of the eldest, and from that circumstance I ventured to say that she would pass through
the

complaint mildly. It is her case only that I shall now relate.

5th.---Was taken ill, and appeared as children beginning to sicken usually do: the arm had that kind of appearance it commonly has, when the patient first begins to complain.

6th.---Had a very restless, feverish night---but grew much better when taken out into the air.

7th.---Passed an easier night than the last, though but a very indifferent one. The incision on the arm had about one large drop of matter upon it, which was accidentally rubbed off as I was preparing to take some on the points of my lancets. There were two or three spots out, which appeared to the friends to be variolous eruptions; but they never suppurated.

8th.---

8th.---She appeared quite well---the arm scabbed over---and I did not hesitate to say, she was perfectly secure from any future inconvenience from the small-pox.

In delivering this opinion, I thought myself warranted not only from my own experience, (never having been able to communicate the small pox to any patient whose arms had inflamed, and who had even a much less degree of fever,) but likewise from the observation of Baron Dimfdale, who has related several cases where the disease happened very suddenly after the infection, and where no eruptions have appeared, or if any have, they have not looked like true pocks, nor matured like them. He says, “ I have
“ seen some cases wherein the disease has
“ happened so suddenly after infection,
that,

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“ that the whole affair has been terminat-
“ ed, purges taken, and the patient re-
“ turned home perfectly well in a week’s
“ time, before others inoculated at the same
“ time, from the same patient, and under
“ the same circumstances, have begun to
“ complain.” P. 47. “ No eruption
“ appears at the time it may be expected,
“ but the arm gets well very soon, and
“ the disease is at an end. There have
“ however been some examples where a
“ few eruptions have appeared, and prob-
“ ably in consequence of the inocula-
“ tion ; yet the pustules have not looked
“ like the true pocks, nor matured like
“ them, nor lasted longer than three days,
“ about which they for the most part
“ died away.” P. 49. “ When sub-
“ jects of this sort first occurred in my
“ practice, I was in doubt whether they
“ were quite secure from any future at-
tacks

“ tacks of the distemper ; and in order to
 “ try whether they were so or not, I
 “ inoculated them a second time, and
 “ caused them to associate with persons in
 “ every stage of the disease, and to try
 “ all other means of catching the infec-
 “ tion ; and this method has been prac-
 “ tised with the generality of such patients
 “ ever since ; *yet without a single instance*
 “ *of its producing any disorder* ; so that I
 “ now make no scruple of pronouncing
 “ them *perfectly safe*.”

Having mentioned these circumstances
 I now proceed to relate the sequel of the
 case.

I was so thoroughly satisfied that this
 young lady had the disease, that I did
 not inoculate her again, till repeatedly
 urged to it by some of the family—but to
 satisfy them, I inoculated her again, on

S

the

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the 2d of June, 14 days from the time of the first inoculation, when the incisions were quite well. She was now inoculated from a lad under the eruptive fever.

2d day after the second inoculation—the incisions were somewhat inflamed, and had the same appearance as after the first inoculation. The inflammation increased very little for eight or ten days.

17th.—She became sick and feverish, and appeared to be affected in exactly the same way as with the preceding inoculation.

19th or 20th.—Very full of a rash and a few small-pox among them, but she was as well as those usually are, who pass through the disease mildly.

The rash gradually died away in two or three days, and there were 72 pustules which matured properly, and turned on
the

the seventh day:—they were most evidently variolous.*

The youngest sister passed through the complaint from the first inoculation in the same slight manner without any eruptions succeeding the fever—she was therefore inoculated a second time, but without effect: and has since been repeatedly exposed among those who have had the small-pox without the least inconvenience.

Several instances are recorded of anomalous appearances attending the inoculation for the small-pox:—The case just re-

* On Account of the peculiarity of this case, and to prevent any dispute about it, I was desirous that it might be seen by other medical gentlemen,—a physician of London who was at that time visiting me, accordingly saw her, and immediately pronounced it to be the small-pox; indeed it was so evident there was no possibility of being mistaken.

lated resembles none that I have met with so much as that of the Duchefs of Boufflers, who was universally believed to have had the difeafe twice, once by inoculation, and again by infection from the natural small-pox---indeed Mr. Gatti the celebrated inoculator at Paris repeatedly affured the Duchefs that the small-pox had taken effect, and that ſhe had nothing further to fear from that difeafe.---And it is natural to conclude that he was particularly attentive to the appearances of the arm in a patient of ſuch rank and confequence:---But notwithstanding, it appears to me, that the difeafe of my patient was more diſtinctly marked than the difeafe of M. Gatti's patient---for it ſhould ſeem that although the arms of both ſuppurated very well, yet that the ſymptoms of fever were very flight and continued only a few hours in the Duchefs---whereas the
fever

fever was pretty sharp nearly three days on my patient, and during that time she experienced the same relief that variolous patients always do, on exposure to the air.

C A S E S II. III. and IV.

The three children of Mr. Colyer of Dundale, one of a year and half, another of three years, and the other of four years old, were on the tenth of February, 1790, inoculated by me with matter from a woman, on the fifteenth day after the eruption of the natural small-pox, and who was extremely full of the distinct fort.

The incisions on the arms inflamed properly, and on the seventh or eighth day they began to have the common febrile symptoms in a moderate degree—

S 3 satisfied

satisfied that they *had* the disease *effectually* and that they would get through it safely, I did not as they lived at some distance in the country, see them any more, I was informed, however, that the eldest and the youngest had a few eruptions, and the other a considerable number, which those who were about the children said had every appearance of true variolous pustules.

About one month from the time of the inoculation, the eldest of the children became very feverish, and after a few days had an eruption of pustules, which I saw the seventh day of the eruption, and found to be, beyond the possibility of a doubt, the small-pox--the child was very full of the distinct kind, but the disease terminated favourably.

Eight days from the attack of the eldest, one of the others became ill, and
had

had the small-pox also, but in a milder degree.

And eight days from the attack of the second, the third was affected in the same manner—it had not so many as either of the others, but they were most evidently the true small-pox.

The mother informed me, that some time after the eldest had recovered from the inoculation, he met a child very full of the small-pox, from whom she supposes, as indeed is most probable, the second disease was caught.

That the matter with which these children were inoculated was really the true variolous matter, will not admit of the smallest doubt, for independent of the improbability of my mistaking a very full and large species of the small-pox, which

passed through every stage in the most distinct and regular manner, for any other eruption,---it was taken from a woman travelling through the country, but who became so very ill as to be unable to continue her journey, and from this individual (for there was no one beside herself that I could learn, had it) the small-pox was, both by natural and artificial infection, propagated more extensively, than I ever recollect to have known on any former occasion.

That the inflammation of the arms made the same progress, and had the *appearance* inoculated arms usually have, is very certain---but whether it was *really* the variolous inflammation, I am unable to determine, as I did not inoculate any one from them, a circumstance I should by no means have omitted, if I had entertained the least doubt of the fact.

The

The eruptive fever made its appearance at the usual time, the seventh and eighth days ; it continued two or three days, and then the eruptions made their appearance ; what were the precise appearances of those eruptions, and whether they were really variolous, I cannot determine, as I did not see them, or cause any one to be inoculated from them.

About the latter end of September all these children caught the chicken-pox ; (Varicella of Dr. Cullen ;) after a slight fever of two days, watery eruptions made their appearance ; these continued about two days, never more than three, then scabbed over, and soon became well.

C A S E V.

J. Wallis, of the parish of South-fleet, three years and an half old, was inoculated in March 1790—arm inflamed, and had the same appearance as many other children that were inoculated at the same time. He sickened rather earlier than the other children; the fever abated on the ninth day; and three or four pustules made their appearance, which were considered by every one as exactly like the small-pox. I was informed that the arm looked much inflamed, and that it contained a quantity of matter, as it stained the linen very much.

Exactly seven weeks after inoculation, the natural small-pox appeared—I saw the child on the seventh day of the eruption,
at

at which time its face was extremely full of a very fine and distinct sort.

CASE VI.

Mary Miller, thirteen years old, was inoculated at the same time---the arm rose very well, but was more inflamed, and contained even a larger quantity of matter than the arm of the child just mentioned; she was not observed to be at all ill, or to have any eruptions.

Seven weeks from the inoculation she was seized with a fever, and in two or three days a very fine sort of small-pox came out upon her, which I saw fully matured on the seventh day.

The arm must have been very much inflamed with the first infection, for when I saw her eight weeks afterwards, a very
large

large scab, equal in size to a shilling, and an eighth of an inch thick, remained upon it, notwithstanding the small-pox had attained their height.

C A S E . VII.

Elizabeth Hart, two years old, was inoculated at the same time the other children were,—the arm inflamed very well and had matter in it, she began to sicken on the seventh day, continued ill two days, then grew better, and as she grew better, several eruptions came out, which were taken to be the small-pox:—seven weeks afterwards, however, she was taken with the natural small-pox, and I saw her when they were at the height,

The

The children which were the subjects of the last three cases were, with a great many more belonging to the parish of South-fleet, inoculated at the same time. They were inoculated indiscriminately with the rest, some of whom had the small-pox to such a degree as to leave no room to doubt the fact.—The natural small-pox has since been much, and in a great degree, in the neighbourhood, so that almost all the inoculated children were constantly exposed to the infection, and must inevitably have caught it, if they had not already passed through the disease.

It is clear in the cases just related, that a disease of some kind was propagated by inoculation—*the incisions inflamed as they usually do in the real small-pox—the fever commenced at the most common period—continued the same length of time—and terminated, (except in the first case) in the eruption*

eruption of pustules, but few of these pustules indeed, as I understood, have matured completely, but every one knows that this is frequently the case in the real small-pox when the eruptive symptoms have been moderate.

Such was the real state of these patients—and every one is at liberty to draw such conclusions from them, as he may think they will admit of. I will not hazard an opinion upon their cases—but I will with great diffidence venture to ask---whether these anomalous cases may not be in some measure explained in this manner?—That the first diseases were not the true small-pox, will I imagine be universally allowed, as all the patients had it some time after in a manner so decisive as not to leave the least room for doubt: and I do not believe there ever was a well authenticated instance of the small-pox occurring
twice

twice in the same person—the resemblance however between the two diseases is so remarkably striking, that it should seem to point out there was some very intimate connection between them :—so very close indeed do they appear to be connected, that I am disposed to consider the first as arising from a *certain degree* of variolous infection, but which infection was not sufficiently powerful to propagate the disease fully and completely.

This anomalous complaint then appears to depend upon a certain degree of feebleness or impotency in the infecting matter, which may perhaps be thus accounted for.

So long as the variolous matter continues unaltered and possesses its common properties, it is capable of producing the small-pox, when applied to a body that has not previously had the disease—but
every

every one knows, that when variolous matter has been kept a length of time, particularly if it has not been thoroughly dried, and the air properly excluded from it, it entirely loses its property of propagating the disease :—the loss of this property as I take it, is owing to the spontaneous fermentation which the matter undergoes—if it proceed to a particular degree, its nature is so entirely altered, that it either does not produce any effect whatever, or else a *simple* inflammation on the part to which it is applied : but it appears to me, that when the matter is just *beginning to change its quality*, and before it has made any material progress, that it is then capable of producing an effect, not only upon the part to which it is applied, but upon the constitution at large :—this effect will not be exactly the same as that produced by the pure matter, because
its

its nature is in some measure altered, but it will still resemble it in a certain degree, and the resemblance will be, in proportion as the matter partakes more or less of its original properties:—hence it may be conceived that the arm should inflame at the usual time, and have the usual appearances—that it should be absorbed, and produce its effect on the habit at the common period—that the fever should continue the usual length of time, and terminate in an eruption of the skin;—but that this eruption does not partake so perfectly of the variolous property, but the constitution will undergo another and more perfect change, upon the application of a more perfect and powerful cause.

It still remains to shew how this idea may be applied to the cases under our consideration.

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With

With respect to the cases of the three children related in Cases II. III. and IV. I very well remember inoculating them with matter taken from the only remaining pustule on the body of a woman, on the fifteenth day of eruption, when she appeared perfectly recovered, and all the other pustules were dried away.—Under these circumstances it is natural to conclude, that this matter was somewhat altered in its properties, and consequently liable to produce an irregular disease.

As to the others I could not obtain sufficiently correct information from whence the matter was procured with which they were inoculated.—I will therefore only observe that it is a very frequent practice, particularly when many are to be inoculated, and in the country : to collect a
 quantity

quantity of the matter upon lint, to inclose it in a vial, and to inoculate from this as occasion may require:—in a certain time the matter commences its fermentation—and if any is used at the precise period I have hinted at, the disease in question may then be produced.

It may perhaps be objected to this, that variolous matter with which people are inoculated must be so frequently in a state of fermentation, that the disease about which we have been treating, must, if it depends upon such circumstance, have been much more general than we in reality have reason to believe it has been. —To this I answer it is at one precise period, and then only, that I consider the matter as being able to produce such effect, and that it is probable

it may be in this state only a very short time, for if it has not commenced its fermentation, it will produce the true small-pox—and if that process has advanced the smallest degree too far, it will not then produce any constitutional effect whatever.

Whether this idea is properly founded, it might be of some consequence to determine—but at any rate we may, from the cases related, gain one piece of useful and important information—never to employ variolous matter except when it is perfectly fresh; and not to be too confident that the patient has absolutely had the small-pox, unless the pustules have passed through a regular maturation.

The following case has occurred since the former were written ;——as such do not, I believe, by any means frequently happen, and as it is an additional proof of the necessity of attending to the advice just intimated, it may not perhaps be improper to relate it in this place.

C A S E VIII.

Elizabeth Brazier, three years old, was inoculated by the same person who inoculated Wallis, Miller, &c. and almost at the same time.

Her arm rose very well, and the fever came on at the usual time, after which

T 3 about

278 INOCULATION OF SMALL-POX.

about thirty pustules made their appearance---they continued out six or seven days.

Her parents afterwards informed me, that in the month of May she caught the natural small-pox from some of the neighbours, and that she was as full as she possibly could be.

C A S E IX.

Mrs. Childmaid's child, 14 months old, was inoculated on the twenty-first of September, from a boy extremely full of the confluent small-pox, on the tenth day of the disease. The child's arm inflamed considerably, and had exactly the same
appear-

appearance as its sister's, who was inoculated at the same time, from the same boy, and who sickened on the ninth day. This infant however, notwithstanding the three incisions, inflamed to the extent at least of a silver three-pence, and suppurated equally as much as those of its sister; had no eruptions, nor was any feverishness perceived.

From the general event of my own practice, as well as the authority of Baron Dimsdale and others, more particularly explained in the first case related in this Memoir, I should have concluded this child was perfectly secure from any future infection; but the event of that case determined me to inoculate him again; this was accordingly done on the fifth of October with fresh matter from the brother of the boy, I before inoculated him

T 4 from,

from, on the tenth day of a very full and distinct fort.

I saw him on the eleventh of October—the four incisions were very much inflamed, each to the extent of my thumb nail:—in the afternoon the child was perceived to be ill—he became feverish and passed a very restless night.

12th.—continued in the same state and passed a very restless night.

13th—the child was much better: a few small eruptions perceivable. The incisions scabbed over, but considerable quantity of matter underneath.

The eruptions to the amount of about thirty or forty gradually increased in size, and on the twentieth began to be incrusted over:—they were beyond the possibility of a doubt, the true small-pox.

The

The last scab from the first inoculation was picked off, at the time the eruptions turned, that is one month after the matter was inserted

RUPTURE OF THE UTERUS,

TERMINATING FAVOURABLY.

RUPTURES of the uterus so very generally terminate in death, that I believe, even at the present day, there are many who do not conceive an instance ever occurred that terminated in recovery, that such cases however have really happened, cannot surely be doubted by those who have seen Dr. Douglas's account of Mrs. Manning's case, and Dr. Hamilton's case in his outlines of Midwifery. Perhaps to these may be added the case Dr. Douglas mentions from Heister, and another from
Peu;

Peu ; but besides these I do not believe there are on record any instances well authenticated, that terminated favourably. As these cases therefore are so very rare and uncommon, I am satisfied the Society will with pleasure receive an account of one which terminated in the most favourable manner. It occurred under the observation of a very particular friend of mine, Dr. Beugo, of Rochester, who was so good as to transmit it to me, and I shall beg leave without further preface to lay it before the Society.

The CASE of MRS. WILLIAMS.

Mr. Stanton's account.

April 29th. 1791. Was desired to visit Mrs. Williams who was of a relaxed habit

bit of body, about twenty-eight years of age, and in the seventh month of her pregnancy.

Nothing material had occurred during the former part of her pregnancy, but a day or two previous to my seeing her, a very profuse hæmorrhage had taken place, and she had slight pains in the region of the uterus.

30th. The pain very materially increased, the hæmorrhage had been very inconsiderable. A glyster was thrown up, which produced a sufficient evacuation, and a few drops of tr. opij were given in a mixture of nitre and pulv. tragac. c. the pain continued very violent, and towards evening began to bear down.

Upon examination I could not discover the os internum the least dilated.

May

May 1st. On examining at one o'clock in the morning, I found the membranes ruptured, and the os internum so much dilated, that I clearly discovered the presentation of the shoulder, the hand and arm being situated behind the child: The patient appearing much exhausted, and her attendants extremely anxious about her safety, I solicited the assistance of Dr. Beugo; but before his arrival, I endeavoured (during an interval of pain) to bring the arm forward, in order to prosecute the turn with the greater facility; which I accomplished much sooner and with greater success than I expected. The foetus was highly putrid, and from appearance, must have been sometime dead.

Waiting in vain, for a pain to assist in extracting the placenta, I was forced to introduce my hand into the uterus (as
the

the funis was perfectly rotten) and withdrew the greater part of it. On the second attempt, to bring away the remainder, I discovered a very alarming laceration through the posterior and inferior part of the uterus. Dr. Beugo now entering the room and examining, expressed his surprise, feeling distinctly the intestines and their convolutions.

May 2nd. The patient much better than I expected, notwithstanding severe pain about the uterus and abdomen, which I was pleased to find alleviated by an enema of milk, soft sugar, and oil, she afterwards took a mixture of nitre and opium.

The third day after delivery, the pain great, the discharge highly tinctured with blood.

On the fourth day, the pain very little, the discharge trifling, repeated the medicine as before.

The fifth day, entirely free from pain. From that time altered her plan of regimen, when she every day recovered her strength, and at the end of three weeks pursued her usual domestic employment.

Dr. Beugo's Account.

As soon as I introduced my fingers as far as the lower part of the sacrum, I met with a large clot of blood, as big as an ordinary egg, which I found, upon the re-introduction of my hand, had lain opposite to an opening, over which hung a loose jagged flap ; and behind it I met with several convolutions of intestine, which I took between my fingers and thumb, to be ascertained of what they were ; in this manner I traced at least
three

three convolutions : distinctly perceiving at the same time the mesentery, and afterwards I pushed the whole up with my fingers beyond the middle of the hollow of the sacrum ; but on with-drawing my fingers, the convolutions descended also, tho' not quite so low as at first I found them. Through the opening my four fingers could easily pass. It seemed to be about the middle of the hollow of the sacrum. I afterwards drew back my fingers, and found the cavity of the uterus considerably contracted above that point.

In addition to Mr. Stanton's account, I have only to add, that no sickness or vomiting came on. She did not complain of faintness, and no particular alteration was perceived in the pulse ; in short, neither at the time I first saw her, which was immediately after the rupture

must have taken place, or at any subsequent period did she appear to sustain any material inconvenience from the accident. I was, from one circumstance or another always prevented examining the state of the discharge, but I was repeatedly informed, that it was in proper quantity, that it had the usual appearance, and that no matter was at any time to be perceived. She was ordered a low cooling diet, and such medicines as were calculated to avoid general inflammation.

She has since had another child at the full time without any particular disturbance, trouble or uneasiness, perceptible from the circumstances of the rupture. She thinks the whole process of labour and recovery, with this last child, was in all respects like that with the first child.

She

She always before was subject to a considerable degree of fluor albus, and has been with no remarkable degree of difference still subject to the same.

Case of an unusually large Abscess, seated between the Peritonæum and Abdominal Muscles, from which the matter appeared to be discharged, sometimes by the external Opening, and at other times by Expectoration.

On the 16th. of August 1784. I was desired to visit Mary Galloway, a married woman, aged thirty-six years.

Her chief complaint was a prolapsus uteri, which she first perceived on recovering from a very quick labor in the year 1772, from which time it had gradually increased, and was now the largest and most complete I ever saw.

I was informed that the day preceding my visit, she had been attacked with a slight shivering, succeeded by severe pain

and forenefs over the whole abdomen ; the pain however foon abated, and by the time I faw her had entirely ceafed.

As the uterus had been difplaced fo long, and was fwelled fo confiderably, I prepared for its reduction by repeated gentle aperients and frequent fomentations. After ufing thefe means a few days, I reduced the uterus, though not without confiderable difficulty, and applied a peflary with a ftem, fecured (as I thought) very properly, with compreffes and bandages, but it was equally ineffectual.

In a fhort time the abdomen again became painful and fwelled confiderably ; and the prolapfus increafed in proportion. After ufing fomentations, cataplafms, &c. during four or five days, a fluctuation was evidently perceptible ; a fmall vefication appeared

peared on the navel, and the next day there was an immoderate discharge of foetid, acrid matter, from a small opening in the umbilicus, just large enough to admit the head of a probe. This continued about twelve hours, in which time the quantity of matter evacuated amounted, as nearly as I could guess, to ten or twelve pints. I saw her half an hour after it had burst, and on introducing my probe, as she lay on her back, I passed it in a perpendicular direction quite to the point, and I likewise was able to pass it under the integuments, and as I thought abdominal muscles, in an oblique direction towards the anterior part of the left crista Ilii.

Her pulse which beat from 130 to 140 strokes in a minute, was irregular and extremely feeble : her tongue was covered with a thin, dry, brownish sordes ; her
teeth

teeth were free from moisture, and white like a dead bone ; her flesh was greatly emaciated and her whole countenance truly hippocratic.

I observed above that on introducing the probe, it passed immediately and very readily down towards the spine; next morning when between ten and twelve pints were discharged, I found it impossible pass the probe in the same perpendicular to direction, though it went very readily four or five inches towards the left ilium; so that, without exerting a greater degree of force, or examining more minutely, than we thought prudent, we could not determine whether the disease was or was not seated in the cavity of the abdomen.

Notwithstanding the reduced state my patient was in, and the little probability there seemed to be of her recovery, I did
not

not hesitate to advise her to have the opening enlarged, with a view, not only of allowing a free exit to the matter, but likewise to give us an opportunity of ascertaining the nature and seat of the disease, and in consequence, determining what might be proper to be pursued in future : but all the arguments I employed were of no avail, as she obstinately persisted in refusing to permit the use of the scalpel. She was also equally averse to the application of a caustic or seton.

I therefore advised her to be kept as clean as her situation would allow, and the room to be properly ventilated ; at the same time recommending such a posture as would facilitate the discharge of the matter ; and directing an assistant to press in the course of the sinuses several times in the day.

For

For some time the patient's stomach had been so irritable, as not to retain the bark in any form, but now she was able to take it together with an anodyne at night. The use of these medicines was followed by more rest at night, an abatement of the quickness of the pulse, and some little inclination for nourishment.

It gave me great pleasure to perceive the advantage we gained from this mode of treatment, notwithstanding the immoderate quantity of matter discharged during the first week, after which time the quantity of it daily lessened, the fever abated, her strength, spirits, and appetite, increased; and on the twenty-first day, from the time the abscess burst, the wound was healed.

It was a considerable time before she compleatly recovered her health, but
several

several months are now elapsed, and she has had no return of her complaint.

During my attendance, I observed a circumstance which surprized me not a little ; it was this : at the time I first saw her, she was troubled with a short cough, which was at first dry, but on the third day after the abcess burst, the matter from the opening almost ceased to flow, and she expectorated a vast quantity of what appeared to me to be pus, mixed with frothy mucus, equal in measure as was supposed, to the discharge which ought to have been evacuated from the wound in the same time. This expectoration, the first time, continued twenty four hours, and it afterwards returned several times, lasting from six to eighteen hours each time : it would then nearly cease, and the matter would soon after run as freely as before from the wound. This
expec-

expectoration of pus alternating with the discharge from the opening, continued till the wound almost healed, and then finally stopped. The two discharges never occurred, except in a very trivial degree, at the same time.

The circumstances of this case render it very probable, that the tumor was not encysted, but that it was seated between the peritonœum and abdominal muscles. Supposing this to have been the case, it may seem wonderful, that the discharge should not have made its way into the cavity of the abdomen, rather than by the umbilicus: however, when we recollect that the external lamina, or what may be more properly called the cellular substance, of the peritonœum, is in some subjects a very thick and firm membrane, and that the integuments are much thinner at the umbilicus, than at any other
part

part of the abdomen, it will in a great measure relieve us from this difficulty.

About six months after the date of my former account, the patient began to be affected with symptoms of pulmonary consumption; and in the latter end of November 1786, when I was again desired to see her, I found her in the last stage of that disease.

She informed me, that she had not had either pain or swelling in the abdomen since I last saw her; and that the prolapsus utery had occasioned scarcely any inconvenience. On examining the abdomen, which on account of her emaciated state, I was enabled to do very accurately, there appeared for the space of
two

two inches round the navel, to be a complete opening through the abdominal muscles down to the peritonœum; but the integuments were very sound, and there had never been any tendency to a protrusion of the intestines.

In a few days she died. I lamented I could not ascertain the precise state of the parts that had been so peculiarly affected; but an unlucky concurrence of circumstances prevented my opening the body.

Account of an extraordinary disorder in which the patient after suffering amputation of the thigh for a carious ulcer on the leg, was at different times attacked with the same painful sensations, and which as she imagined occupied exactly the same place as before the limb was removed.

Mrs. Evans, aged 40, corpulent and of a plethoric habit, was thirteen years since attacked with an inflammation on her left instep, which at first was of small extent, but in a short time it increased considerably. The inflammation spread round the ankle and up to the knee, ulceration soon

took place and the tibia became carious nearly throughout. It was from the beginning attended with excruciating torture, notwithstanding every remedy was made use of which the skill and experience of an eminent Surgeon could suggest, — bleedings both topical and general frequently repeated, emollient and anodyne fomentations and cataplasms, with the free use of opium internally, alleviated the pain, while cauterising, perforating, and rasping the bone, procured several exfoliations.—In this manner did they for several months procrastinate the unhappy hour when she was to suffer amputation ; but the flame broke out with redoubled violence, occasioning fever with a long list of dreadful symptoms that was nearly putting an end to her miserable existence, and in this extremity, that operation was recom-

recommended above the knee, as the only probable means of saving her life.

To this operation she most willingly submitted, naturally concluding it would either remove her agonizing complaint or put a period to her existence ; but even in this expectation, the unhappy woman was wretchedly mistaken, for in a few days after her leg was removed, *she was attacked with her old disorder equally excruciating and distressing as before, and in her imagination occupying exactly the same place, that is, all the space between the ankle and the knee !* in this state she continued three or four days, it then went off suddenly. The surgeons endeavoured to persuade themselves this was little more than that common sensation which every one experiences after amputation in a greater or less degree : a very short time

however fully convinced them, there was something more extraordinary in this case than is usually observed in others, for in about six weeks, the same painful symptoms occurred again, and during the space of seven years generally returned once in about two months. Since that time the returns have been far less frequent, not having in general more than one fit in a year: when however they do come, they are commonly more violent and continue a greater length of time.

The pain is preceded by shivering and sickness of the stomach, after which the skin becomes hot, the pulse rather quick and full, and the tongue white. The stump during this painful period is not in the least swelled or inflamed, it may even be pressed very hard with impunity, but when the pains are very strong the flexor muscles

muscles of the thigh sometimes act so suddenly and forcibly that the mutilated member is repeatedly jerked upward with so violent a motion, that she cannot with the assistance of her hands retain it in the usual position.

The complaint sometimes goes off gradually and sometimes it leaves her in an instant; when it happens in the manner last mentioned, it flies immediately to the throat and stomach, occasioning as nearly as I can comprehend, the same sensations as are experienced by persons who labor under that distressing symptom the *globus hystericus*.

The mode of treatment which I have by experience found the most serviceable during the fits, is, first to take away about ten oz. of blood, and to repeat the

X 3 operation

operation occasionally ; afterwards, the following pills, Rj Extr. Thebaic.—Camphor. aa ʒ—Calomel gr. viij—Tart. Emetic qd. ij—Cons. Cynosb. q. s ut fl. Massa, divid in 20 pils—of these six are to be taken immediately and three or four every hour, or half hour, till the pain is abated or till they procure sleep—these keep the bowels pretty open, sometimes occasion a little sickness, and when properly persevered in, always procure ease ; but notwithstanding this plan is had recourse to immediately, it is generally three or four days and sometimes six or eight before she is quite free. The most violent fit she ever experienced threw her into a rheumatic fever, which confined her to the bed several months.

A great variety of medicines, particularly the Bark, Extract of hemlock and
Calomel,

Calomel, have been given in the intervals, but they did not appear to have any influence either in preventing the repetition, or diminishing the severity of the fits. Setons, issues and perpetual blisters have been frequently applied, but no discharge of any importance could ever be procured from either, latterly however, it has been observed that a few days preceeding and during the whole time of Menstruation, (which since the Amputation is in general very regular both as to quantity and time) a portion of blood is discharged by the issue, which stops as soon as that period is over.

About seven years since, she was very much subject to head-achs, for which she took the Gum pills with apparent advantage: these pains afflicted her at times for two or three years, and when they left her, the other leg became frequently af-

fected with an erysipelatous inflammation
 seated just above the outer angle, and ex-
 tending about the size of the palm of the
 hand ; in the middle there is generally a
 small ulcer, which altho' it has not the
 appearance is often attended with very
 violent pain, but neither the fibula or its
 periosteum seem any ways diseased. Me-
 dicines of various sorts, and applications
 of almost every nature, have been tried,
 but in general without success ; laudanum
 on lint, or mixed with a soft poultice, was
 found to sit easiest, but she has lately used
 fomentations and cataplasms prepared
 with fresh hemlock and has experienced
 greater advantage from them than from
 any other application. The issue was
 directed to be kept open and a seton was
 again inserted into the neck with a view
 of obtaining as great a discharge from the
 constitution as could readily be procured.

She

She was likewise sometime since much troubled with an obstinate fore throat, but on inspecting the parts they were no ways altered from an healthy state; frequent blistering and stimulating applications were of the most tho' not of any very great advantage, every thing else seemed to do no good: it continued about two months, then went off spontaneously.

That the whole of this person's complaints, altho' they appear under various forms, proceed from the same cause, appears very evident, and it is equally plain, that the predisponent cause is a very high degree of irritability of the nervous system: but what the proximate cause is, I am unable to determine: thus far however I can with propriety observe, that once immediately after an unusually severe storm of thunder and lightning,
 she

314 EXTRAORDINARY DISORDER.

she had a very violent attack, and several times it has come upon her, at or near the time of the full and change of the moon.

Two or three years after the preceeding account was written, Mrs. Evans was suddenly attacked with an apoplexy which in less than twenty four hours proved mortal. The next day I opened her head, and from the left ventricle removed a coagulum of blood weighing I should apprehend about two ounces, which was undoubtedly the cause of her death.

In a case so mysterious and which so nearly resembled what is commonly understood by "nervous affection"—(which in my mind implies a disordered action, rather

rather than a disease)---it was not reasonable to expect that much light would be thrown upon the subject by dissection---I however paid particular attention to every part of the brain, but could not discover any thing remarkable or preternatural except a small bone about twice the size of a barley corn attached to the falciform process of the dura mater---it was rather smooth than rough, and did not appear to have injured or inflamed that part of the brain upon which it pressed,---whether it might have irritated the brain or nervous system or have had any influence in the production of the above uncommon complaint (similar to which I never saw, heard or read of one) I leave others to determine ; if my recollection does not fail me however, several writers have mentioned extraordinary

316 EXTRAORDINARY DISORDER.

dinary and unaccountable symptoms having sometimes occurred in cases where upon dissection, a deposition of bony matter was found on some part of the falciform process.

*Recommendation of Electricity for the cure
of the Cataract: illustrated by a case.*

Mrs. Bray of Gravesend, a widow, aged sixty, much subject to hypochondriac affection, was, in May, 1785, without any apparent cause, seized with a pain in the fore part of her head, and shortly after with a considerable dimness of sight: in a few days these symptoms became so urgent, that my assistance was requested.

I was then informed the pain occupied the entire fore part of the head, both internally, and externally, but that it was more particularly severe in the space between the temples: it was said to be neither burning, pricking, nor pulsatory, but dull, heavy and constant, neither changing its place,
nor

nor becoming intermittent, or even remittent, it was the same in an horizontal and in an erect position and it did not seem materially increased either by coughing, sneezing, or a long continued inspiration.

Her pulse was natural, both as to strength and quickness. Her tongue was moist, and somewhat white. There was no giddiness, or tendency to delirium, and all her senses, that of seeing excepted, were perfectly clear.

Her appetite and sleep had almost forsaken her; her spirits were extremely low and her countenance carried indubitable marks of the anxiety of her mind.

On examining her eyes, I found the crystalline humours changed to a pearl colour, and observed two or three specks, the remains of former inflammations, on the cornea of one eye; one of these
specks

specks was situated immediately before the pupil, so that it prevented my having a perfect view of the crystalline; and as in some measure it excluded the rays of light from falling on the retina, it probably occasioned the iris to have very little motion. Whether this, however, was really the reason or not, I will not determine; but the fact is, the pupil of this eye was much smaller than that of the other, and it had likewise less motion.

She very readily perceived the light, and was capable of distinguishing bright and luminous objects; but the darker colours made very little impression upon her; and what rather surpris'd me was, that she appeared to be nearly as sensible of the light, &c. with that eye which had specks before the pupil, and which had little or no motion in it as with the
other,

other, which was perfectly free from those circumstances.

A large blister was applied to the neck, some æthereal spirit was frequently held to her forehead, and she was directed to take some gentle physic. By these means the pain in the head was very much alleviated, and in a few days, it entirely ceased. The opacity of the crystalline humors, however, did not abate, and her blindness, if there was any alteration, seemed rather to increase. The extraction of the humour was recommended ; but she persisted in the determination of ever remaining in her present wretched situation, rather than submit to that operation.

That nothing might be omitted from which even the most distant probability of success

success might arise, I determined to try the effects of electricity, thoroughly persuaded of the total inefficacy of every other, remedy, and indeed, from this wonderful agent, my expectations were not very sanguine.

The electric fluid, therefore, was, by means of a wooden point, drawn from the cornea, while she sat on the insulated chair, daily for the space of a month. The operation each time was continued about a quarter of an hour. At the expiration of the month I did not perceive the opacity of the humours was at all diminished, nor did my patient think that her sight was in any degree altered for the better. I was unwilling, however, to relinquish the only plan from which I could reasonably expect to derive any benefit, and therefore resolved

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to

to direct small sparks through the diseased humours; this was done about a week, and then very small shocks, from a jar containing about an hundred inches of coated surface, were substituted in their place. The gentlest shock however, that could be given from this was so powerful, and irritated her so much, that a small vial, with no more than twelve inches, was used in lieu of the larger one: forty or fifty shocks from this, of not more than one tenth of an inch in length, were daily directed through each eye, and these she bore tolerably well; but if either their number or strength were materially increased, it occasioned a severe pain in the head.

Soon after this course had commenced, she began to see somewhat distinctly; and when it had been continued a month, she

was

was so much benefited as to be able to read, at one time, ten or twelve pages of very small print, and to hem an handkerchief in a tolerable manner, equally well indeed, I was informed, as she had done two years before.

The crystalline humours were now almost, if not entirely, as clear as is usual in people of her age, and, in short, she was altogether infinitely better than my most sanguine expectations could have allowed me to hope.

I mentioned, in the beginning of this account, that my patient was, at times, subject to hypochondriac affections: I am extremely concerned to have occasion to add, that about this time, she was again attacked, with that complaint, which now resembled the disease treated of by Sauvages under the title of *Hypochondriasis Melancholica*.

This unfortunate occurrence closed our proceedings, and with that, every idea of farther recovery vanished.

I was first induced to make trial of electricity in this case, by reflecting on the great advantage I had in many instances received from its application in obstructions of various parts of the body, but more particularly in inflammations of the external coats of the eyes; and that whether the inflammation was mild or severe, recent or of long standing: in short, whether it was a truly acute inflammation, or merely a relaxation and over distention of the vessels in consequence of inflammation, I do not recollect a single instance in which it did not effectually answer my expectations.

The

The real causes of these opacities are probably unknown ; but when we recollect that the capsula of the crystalline humour is supplied with capillary vessels from some of the small ramifications of the ocular artery, and that vessels have been seen running from the capsula into the body of the humour itself, we can easily conceive that inflammation and obstruction may, upon the application of certain exciting causes, just as readily occur in these vessels as in those of the cornea, sclerotica, or any other part. Now, as I before mentioned, that in inflammations and obstructions of the external membranes of the eye, I had applied electricity with greater advantage than any other means ; and, as I conceived it probable there was some analogy between those diseases and the case under consideration, I was induced to employ the same remedy.

And although electricity in the above case did not effect a cure, yet the advantages derived from it were so very evident, and so infinitely superiour to what I ever saw produced by any other means, that I have no doubt but a complete cure would have been accomplished, if our operations had not been prematurely stopped; and I am the more disposed to be of this opinion, since I have read Dr. Knox's account in the ninth volume of the Medical Commentaries, of cataracts in both eyes removed by electricity. It does not appear, however, that his patient was affected in so great a degree as the subject of the case I have related; but I am much inclined to think, that if the remedy had been more powerfully employed, the cure would have been considerably expedited.

A variety

A variety of medicines have at different times, been recommended for the removal of cataracts ; but now that the nature and seat of the disease are thoroughly ascertained, very little confidence is placed in any of them, even in the most recent cases, and under the most favourable circumstances. Mercury is, I believe, allowed to stand at the head of these remedies ; and I have once or twice seen good effects arise from its use in cases which were supposed to be incipient cataracts. I have likewise, in more instances than one, seen the same medicine exhibited in cases of some standing, and where the opacity was nearly complete, but it was never attended with any advantage.

The inefficacy of these remedies has induced practitioners to lay them aside,

and rely entirely for the cure on the removal of the humour.

It is with the view of calling the attention of medical gentlemen to a new remedy, that the present case is laid before them ; and as it is a subject extremely interesting to humanity, comprehending nothing less than the happiness or misery of many unfortunate individuals I have not a doubt but it will receive, what it appears in an eminent degree to merit, a fair and candid trial : it is that which will determine its efficacy, and by that it must stand or fall. If, as we have reason to expect, it should, by experience, be found to prove successful, the sight will be more perfect than when either depression or extraction has taken place ; as in the former case, the lens is merely rendered transparent, whereas in the latter it is entirely

tirely destroyed, and consequently the patient cannot have a distinct vision without the assistance of a convex glass, as a substitute for the humour which is lost. If, on the contrary, it should not be found to succeed, we have the satisfaction of knowing that if it be judiciously applied it cannot produce the least inconvenience.

I cannot conclude without observing, that it appears to me, the more powerfully electricity is applied, provided it does not irritate too much, or occasion too great uneasiness, the more likely will it be to hasten the cure. No particular degree of force, can, with propriety, be fixed on as a standard; for a weak, delicate, irritable woman will be as much affected by a moderate spark, as a hearty, strong, robust man will by a smart shock. Its strength,

strength, like the dose of an active medicine, must be accommodated to the habit and constitution of the patient.

By beginning moderately, and increasing its strength gradually, we shall be certain to avoid doing any mischief, and shall readily be able to ascertain the bounds beyond which we must not proceed. I would therefore advise, that at first, a strong current of electrical aura be directed through the diseased parts: this may be effected (after placing the patient in an insulated chair) by running a pin through the hair, &c. so as to be in contact with the hind part of the head immediately opposite the eye we intend to operate upon, and connecting it with the cushion; at the same time, a director, with a wooden point communicating with the prime conductor of a powerful machine, is to be held

held at a small distance from the eye and, on putting the cylinder in motion, the fluid will pass from one point to the other, and consequently *through* the diseased humours.

When this has been repeated ten or twelve times, small sparks should be substituted in its place. These may very advantageously be given, by placing the knob of a director, connected with the electrometer, so as to touch the most prominent part of the eye, while the pin, connected with the negative conductor, is fixed as in the last method; and in this manner the strength of the sparks may be determined the same as shocks.

As soon as it is thought proper to have recourse to shocks, it will be necessary, in addition to the last mentioned plan, to suspend

suspend a small coated vial from the conductor, and to connect the pin with the outside of the vial instead of the cushion.

There is still another mode of applying our remedy, and it is from this modification of the electric fire I entertain the greatest expectations, as it appears peculiarly adapted to answer our present purpose. It conveys a sensation between a spark and a shock, and is produced by means of a tube inserted into the vial the lower end of which is coated, and in contact with a wire which passes through a ball on the top of the tube. As no particular management is required for this, farther than that already recommended for the application of the shocks, it will be unnecessary to say any thing more upon the subject; and indeed I should think it proper to apologize for
having

having already taken up so much time, if I did not think these few hints might save those some trouble who have not previously been in the habit of making the experiments.

Cases of the Disease which is commonly called Paralysis of the inferior extremities in consequence of a curvature of the spine.

C A S E I.

A Lad, in the twelfth year of his Age, of a fair complexion and a slender make, was, in September 1780, seized with a cold shivering, which continued about five minutes. A fever succeeded and run pretty high the whole night, but towards morning abated. A contraction of his legs ensued, attended with so much debility that he was unable to walk. He complained of pains all over his body, but more particularly about his stomach
and

and the finall of his back. These symptoms induced me to treat it as a fever arising from cold and irregularity. An emetic and some antimonial medicines were prescribed, by which he was in some degree relieved.

The fever sometimes remitted and at other times a complete intermission took place, but without observing any regular period. When the paroxysm came on, I was never able to discover, that it attacked with shivering or even chillness. The power of using his legs daily diminished, and about the tenth day he was utterly incapable of moving them in the least off the ground.

It occurred to me, that this paralysis might probably be the consequence of some tumour on the spine. I examined his back carefully, but at this time no swelling was perceptible. The cause, there-

therefore, appeared to me to be hid in impenetrable darkness. I attempted the use of several medicines; but the boy positively refused to take any of them. All I did therefore was to have the thighs and legs well rubbed with a stimulating embrocation; to apply a blister to the calf of each leg, and one to the sacrum, where the nerves to the lower extremities pass out. This plan on which my whole dependence was placed, did not by any means answer my expectation: but on the contrary, every symptom was manifestly aggravated, with the addition of many circumstances which seemed to predict a speedy and fatal termination.

I called on him at the end of a month from the time of the attack. He appeared then in a most miserable situation; had a short cough, a quick and weak

Z

pulse,

pulse, a purging, very little appetite, and the *facies hippocratica* to the greatest degree I ever observed. It was with the utmost difficulty he could sit in his chair a few minutes; and when he did, the muscles of his back were so remarkably weak they could not support his body, but were bent double. It was extremely distressing to him to be moved in bed; and when any one either bent or extended his legs, it was attended with great pain, particularly in the hips.

In the course of my inquiries, I was informed a swelling had within three or four days appeared on the back. On examination I found it to be of the size of a large duck's egg, but neither much inflamed nor very painful, comprehending the third and fourth vertebræ lumborum. The spine was not disfigured; nor could I perceive the spinal processes
any

any ways affected. Its appearance might very properly be compared to a large abscess beginning to form.

The boy now observed, he always had felt an uneasiness in that part ever since he received a blow there with a stone, which, he said, happened in the morning of the day he was taken ill; and he recollected that it was with difficulty he could walk home, (which was about a mile distant) on account of a pain and weakness in his back. This was the first time he had ever mentioned the circumstance of the blow. I was now perfectly convinced that all his symptoms proceeded from the injury done to the spinal marrow, or its membranes, by this accident; and immediately recollected the advice given us in similar cases by Mr. Pott. But his danger seemed so great, and the probability of any thing giving

him relief so little, that it was with a view to avoid the imputation of inhumanity, and to neglect nothing that seemed to promise even a probability of relief, rather than with any expectation of success, that I determined to try the effect of an issue.

As he lived in the country, and there was no time to lose, instead of applying a caustic, I immediately made an incision the whole length of the tumour, thro' the skin and adipose membrane down to the fascia lumborum. Into this wound I put two small beans. The parts did not appear much diseased; no matter or any other fluid was evacuated, and the fascia was uninjured, and of a silver hue.

The patient continued in nearly the same state as before for three or four days, about which time the wound suppurated

Favourable

favourably. In the short space of a week the good effect of this discharge became evident ; his countenance was more enlivened, his pulse not so quick, and he could move his legs a little in bed. From this period he mended amazingly. At the end of a fortnight his appetite was good ; his fever had entirely left him in the day, and he was but little disturbed by it in the evening.

In three weeks, with a trifling assistance, he was capable of walking round the room. All this time the issue discharged freely ; and in proportion as it discharged, the swelling gradually diminished, so that in about one month from the time the incision was made, no remains of the tumour could be perceived.

His health every day improved considerably, and in five weeks he was so perfectly recovered, that his mother con-

cluding there could be no further occasion for the issue, suffered it to heal.

For the first three months he walked a little limping, and before any material alteration in the weather felt a slight uneasiness in the part where he received the blow ; but when I met him lately, carrying a load on his shoulders, he said he was stronger than before the accident, and that he now never experiences the least inconvenience in his back, either from working or weather.

Various instances have occurred of palsies, somewhat similar to the present ; but I have never heard, or read of one, where the disease so soon arrived at so great a height, where the cure was so quickly completed, or where the remedy was more strongly marked with success. No one, I presume, will hesitate to pronounce the cure to have been entirely effected

effected by the issue, as no other means were pursued, and every symptom assumed a milder aspect as soon as it began to discharge.

CASE II.

Was desired to visit Sarah Simmonds, about three years old, of a delicate complexion, soft flaccid skin, with light hair and blue eyes, from whose Mother I received the following account.

About six week or two months since the child appeared heavy, dull und unwilling to move; in a few days there came on a pain and weakness in the small of the back, extending down the thighs and legs, so as to prevent her either walk-

ing far or briskly, or standing quite upright. In a short time after, whenever she attempted to move, her legs crossed each other, and frequently threw her down: the knees and ancles, but more particularly the knees became contracted and rigid, they were not to be straitned but with some pain and inconvenience, and she found considerable difficulty in turning herself in bed.

This was her situation when I first saw her July 14, 1784.

In every one of these symptoms she agreed perfectly with the accurate history given us by Mr. Pott, of the useless state of the inferiour extremities in consequence of a curvature of the spine, and I was firmly persuaded, this proceeded from the same cause; but on having the child undressed and attentively examining the state of the spine I could not perceive

ceive the least protuberance: somewhat surprized at this, and not knowing what other cause to refer it to, was at a loss what plan to pursue: however as an uncertain and innocent remedy, is undoubtedly at all times (but more particularly under such distressing circumstances) to be preferred to no remedy at all, I did not hesitate to advise an issue to be applied between the 2d. and 3d. vertebræ lumbæ, that being the place where the child repeatedly said her pain and weakness was seated. The mother absolutely refused to allow it to be done: but as she was willing to submit to any thing else, I recommended a pretty large blister to be laid on the small of the back, and ordered it to be kept open a considerable length of time, and took my leave,

Nov,

Nov. 30. Was sent for again, and informed the blister was kept running about a month, during which time, the symptoms were much alleviated and it was allowed to heal: soon after it was healed, all the old symptoms recurred, and with redoubled violence. When I saw her, she was neither able to move her legs the least when in bed, or suffer the smallest weight of the body to bear upon them when supported by an assistant: when sitting (which she could bear for some time tolerably well) they were contracted under her, and drawn across each other; her neck bent considerably forward, and her head fell backward apparently supported on her shoulders by the back of the chair without any assistance from the muscles of the neck; she had the free use of her hands and arms, was
very

very subject to fever, particularly every night, and her bowels had been costive thro' the greatest part of the complaint.

I again had her stripped to examine her back, and now perceived a small tumour situated on the seventh vertebra cervicis, but it was so small, not exceeding the size of a common hedge nut, and situated so exactly on the spinal process of one vertebra only, that not recollecting to have read of a similar case in Mr. Potts treatise, I at first was not satisfied that the symptoms proceeded from it: but observing the neck to bend considerably forward from that part, and conceiving it likely from that circumstance, as well as the whole history, that the body of the vertebra and the connecting ligaments were affected, I was at last thoroughly persuaded it was the seat of the disease

and

and therefore made an issue immediately upon the part.

When I next visited her, the mother informed me that within 48 hours after the issue was cut and before it discharged properly she was evidently better, that is, when she was sitting in the chair she was able to move her legs a little and when lying in bed, still better: on the 7th day, by the assistance of a person taking hold of her hands, she was able to crawl across the room, tho' it was with considerable difficulty she could drag her leg after her. In a month she was able to get out of her chair without any assistance and to walk nearly round the room, by taking hold of the chairs &c. The fever by this time had entirely left her, and her countenance became more healthy. As she grew better it was perceived her left leg was
much

much the worst of the two, it was still drawn under her, and she complained of pain in the toes of that foot.

At the end of three months her health was perfectly re-established, she was able to run about as much and as well as before she was taken ill : the curvature however remains much the same, and the left leg is, if any thing, weaker than the right.

*An Account of the beneficial effects of a
very liberal and long continued applica-
tion of cold water in strictured Herniæ,
and in violent Constipation of the bowels.*

I have in repeated instances of the most dangerously strictured Herniæ, and in some where the operation was determined upon, and prepared for, seen the *long continued application of very cold water* relieve the patient like magic, and allow the hernia to be returned with the greatest facility, when all the usual powerful remedies have not produced the most trivial advantage. I am well aware that cold applications have been a long time in
general

general use in these cases: as they are usually applied I know them to be inefficacious, or that they will only succeed in comparatively slight cases; but in order to produce the full effect, it will be necessary to apply it to a much greater extent than is usually done, or than may by many be thought prudent: but if it be not so done, it will not answer, and the miserable sufferer must perish inevitably, or run the risk of a most painful, dangerous and horrid operation. I might bring forward several instances in support of what I have said, but I think it necessary to state only one, which indeed was the very worst I ever saw.

Case

Case of a violently strictured hernia.

—Everest, about 35 years old, had had a scrotal hernia several years, but as it usually returned into the abdomen on laying in bed, and as it was seldom materially inconvenient to him, he had never applied a truss, or paid any particular attention to it. One day however, soon after dinner, he was attacked with a very severe pain in the part—inflammation and tension came on, and a medical gentleman was immediately sent for—the symptoms had increased so rapidly, and the man was already in so alarming a state, that he called in another: not long after I was sent for, and I saw him about six hours from the first attack.

There was greater tension and inflammation over the whole scrotum than

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I had

I had ever seen in any case before—it was so much enlarged that the penis was entirely hid, and, so exquisitely painful that he could scarcely bear it to be touched.

Before I saw him, he had been blooded and had taken several strong purgations --- Warm fomentations had been applied, and the tobacco glister had been injected.

I immediately gave him an opiate and placing him almost upon his head, I made a gentle attempt at reduction, but without the least prospect of success.

I was thoroughly satisfied that no remedies whatever, short of the operation, would be productive of the least advantage except it was a very liberal application of cold water; and from the many instances I had seen of its good effect in herniæ, and in constipated bowels, I determined to give it a fair chance for the
space

space of three hours, although from the very unusual severity of the symptoms, relief was scarcely to be expected from any thing but the operation, and this we agreed to perform as soon as it should appear that the cold applications did not produce the desired effect.

With this view, sheets were thoroughly wetted with water, artificially cooled by the neutral salts, and dashed over the scrotum, abdomen and thighs—and they were repeated every two minutes for three parts of an hour, without any other effect than that of abating the intensity of the pain.

As this was what might be called a very fair trial, I began to despair—it occurred to me however, that in the most obstinate case of obstructed bowels I had ever witnessed, the patient did not experience relief until he was weakened,

and lowered to such a degree by the cold applications that prudence prevented its further continuance---I resolved therefore in the present instance, to pursue the plan to the same extent as in that case.

Five or six pails full of water, fresh drawn, were ordered into the apartment ; the patient was laid on his back over a tub, large enough to receive the water : one or two garden watering pots were filled with the water and the contents of one of them, poured over the scrotum : as soon as it was emptied, another was used in the same manner, and this process was repeated until the patient *was so much chilled, and the powers of life so much reduced*, that it was thought proper to desist :—at this time the tension of the scrotum was taken off, the parts became corrugated, and with the most trifling assistance, the herniæ was reduced.

Case

Case of a violent Constipation of the Bowels.

As the termination of this most obstinate case is decisively and unequivocally in favor of a plan, which does not seem sufficiently regarded, and as it tends in a remarkable manner to confirm the propriety of a practice which is but imperfectly understood, because it has yet scarcely been employed to its full extent, I hope it may prove a means of introducing it more generally into practice. I am also in possession of several cases of a similar, altho' of a slighter nature, which I do not think necessary to recite, as they all terminated in the most favorable manner,

Daniel Donalson, of a strong, robust constitution, forty eight years old, and

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formerly

formerly a sailor, till October, 1785, enjoyed a good state of health; but at that time while he resided in a workhouse in some part of Lincolnshire, was seized with an irregular intermittent. It continued about three months, and then, by taking a very few medicines, (among which he does not believe there was any bark) it left him. From this period he dated the origin of his complaint; for soon after he was subject to pains in various parts of the abdomen, but more especially in the left hypochondrium, and round the navel. When the pains were violent, the part affected became swelled, and the bowels were costive; but on stools being procured, he immediately grew easy, and the swelling disappeared. He soon perceived that when a sufficiently large quantity of fæces was accumulated, the same symptoms returned,

turned, and he was obliged to have recourse to salts, or some other purging medicine, in order to obtain stools. In this manner was he generally attacked once every four or five days; but as the remedies he commonly made use of, had always given a temporary relief, I was not desired to see him till the 23rd. of March, 1786, when he was taken much worse, in consequence of the medicine having failed in producing its usual effect.

The pain with some degree of tension was general all over the abdomen, but immediately below the navel it was more severe. At this part there was a considerable swelling, which at first seemed a contraction of the abdominal muscles, but afterwards it appeared more likely to be a collection of air or fæces confined in some part of the bowels. He had passed no stools for about a week, and his urine

had been made frequently, and in small quantity ; but there was no great appearance of inflammation or fever, for no rigors had attended ; the pulse was scarcely altered from a healthy state, and as yet he was not attacked either with sickness or vomiting.

Previous to my seeing him he had taken three ounces of salts, which had produced no effect ; a strong dose of jalap and cream of tartar was then given, with no better success. Extract. cathart. and calomel having given relief in a former fit, were now exhibited in large quantities, but with no advantage ; at the same time clysters were had recourse to, which sometimes were retained but frequently voided in the same state as when injected. It seems unnecessary to specify every particular remedy which was made use of. It will suffice perhaps, to mention, that
after

after bleeding, the purging salts, infusion of fenna, jalap, extract: cathart: calomel, castor oil, &c. were by turns employed; and as they occasioned neither sickness nor increase of pain, they were all given in much larger doses than I had ever ventured on myself, or than I had known given to others. The clysters were emollient, oily and purgative; sometimes they were formed with a solution of turpentine, and frequently with a strong infusion of tobacco: the usual quantity of each clyster was a pint; this was ordered to be forcibly injected through a pipe with a bore larger than usual.

The state of the inferior part of the rectum had previously been ascertained, but I now thought it adviseable to examine whether any constriction existed in the lower part of the colon. With this intention, a candle nearly a foot in length,
was

was carefully introduced, but not the least obstruction was perceived: it was, however, suffered to remain till the tallow melted; and conceiving some benefit might arise from a soft substance lying some time in the part, this remedy was again repeated.

The warm bath was used; but it was evident he was in much greater pain while in it than before. As soon as he came out, a clyster of the fumes of tobacco was blown up the rectum: he was again put into the bath, and while in it another smoke clyster was injected, and one more was repeated when he came from it.

The same day a small quantity of cold water was sprinkled on his legs and arms, while he lay on a blanket in a warm room; but the next he was supported on the cold stones of a washhouse perfectly
naked

naked and this during a severe frost, while a pailful of cold water was, at different times, dashed over his legs and thighs and poured down his arms. This, instead of increasing the pain, as the warm bath had done, made him much easier; the relief, however, was but of short continuance, but it was the only effect it produced,

The day following, after a tobacco smoke clyster had been given, he was sick and vomited much. What he brought up tasted powerfully of the tobacco, and bore an exact resemblance, both in appearance and smell, to the liquid fæces which were forced from him by the violent effort of straining. Trivial as this evacuation was, yet, when the sickness had subsided, he thought himself easier for it; I therefore encouraged the vomiting, by giving half a scruple of vitriol. alb. every half
hour

hour till it operated, which it soon did, once or twice, and with similar effect.

Every measure had now been employed, from which I could suggest the most distant probability of success; and the writings of the most eminent among the ancient as well as modern practitioners were in vain ransacked for new remedies.*

To those which I had used, a fair and unprejudiced trial had been given. In particular, a liberal and almost unrestrained use had been made of the strongest purgatives, opium, æther, injections of every kind, (amounting, in number, altogether to fifty,) electricity, the warm bath, the

* I must except quicksilver, against which the concurrent testimony of many respectable authorities, as well as common sense, militate so powerfully, that I did not use it.

application of cold water;—remedies so justly extolled, and so much relied on in the advanced stages of these complaints,—but without the least success.

When I saw him on the fifteenth day of the disease, I found him in the following state:—The bowels continued obstinately constipated; the belly was hard, and immediately below the navel it was swelled somewhat irregularly: the pain was violent, but tense, at times remitting, and increasing much on pressure. The vomitings were frequent, sometimes of a slimy matter, at others stercoraceous, having both the smell and appearance of liquid stools*. The pulse was soft, weak, and irregular; the tongue brown, but

* Once being sick after a tobacco smoke clyster, what was brought up, he said, tasted strongly of tobacco; but I could never learn that any other clyster had a similar effect.

moist;

moist ; the eyes sunk in the sockets, dull and heavy ; the breathing short, frequent, and attended with constant motion of the nostrils ; the hiccup was frequent and harrassing ; his appetite and sleep had almost forsaken him ; he had often a subsultus, sometimes a tendency to delirium, and his urine was scantily secreted, and frequently voided with some pain, depositing a copious brown sediment on standing.

The patient had hitherto sustained his complaint with great fortitude and resolution, and had suffered every plan to be put in execution with singular patience ; but being now become sensible of his extreme danger, he was anxious and dejected ; despair was settled in his countenance, and he requested he might be permitted to die peaceably. This was his situation, and so dreadful did it appear,
that

that an alteration for the better scarce entered my mind.

I join those in opinion who think it better, in desperate cases, to have recourse to doubtful or even dangerous remedies, than suffer the patient to be lost without making use of any means to save him. Were we to observe this as an invariable rule; were we never to relinquish our attempts till they can no longer be employed, it would I am confident, be productive of many extraordinary recoveries. Every practitioner, who is guided by these sentiments, can, doubtless, bring to mind several instances wherein his apparently vain and fruitless perseverance has been crowned with the most unexpected success. The termination, however, of the present case is so decisively in point, that it is unnecessary to ad-

adduce any farther proof in support of the opinion.

Actuated by this principle, and revolving in my mind the effect of the various articles which had been used, I could but observe, that although no evacuation followed the application of the cold water, yet the patient was evidently easier after it; whereas quite the reverse was the case while he was in the warm bath; for he was then in greater pain than usual. This determined me once more to make trial of that remedy; but in order to derive any material advantage from it, I was persuaded it would be necessary to urge it to a much greater length than I had hitherto. This was accordingly done, and to such a degree, that nothing but the extreme danger of the patient could justify my having recourse to such desperate proceeding.

As

As he was now much too weak to be removed into the washhouse, he was supported; sitting on the side of the bed, with his feet in a tub. In this situation two or three pails full of the coldest water were poured over his legs and thighs, so that his feet and ankles were of course constantly immersed in the liquid. This operation was perpetually repeated for the space of ten minutes, when he was so much affected by the intense cold, that I judged it prudent to desist. He was wiped dry, and put to bed. Within the half hour, being then pretty well recovered, a pint and a half of cold water was injected by clyster, and almost immediately after wet napkins were applied cold to the whole abdomen, and renewed as soon as they became in the least warm. The effect of this treatment was so

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strongly

strongly marked, that it was really astonishing; for in a few minutes he had a profuse evacuation of uncommonly hard and large fæces, and this was followed by several thinner ones. He was now comparatively easy: the swelling and hardness of the belly was considerably abated; he had no farther return of the vomiting or hiccup; and there was every appearance of speedy recovery. The stools, however, notwithstanding they were passed in great abundance, did not seem sufficient to answer the intention completely. Several doses of senna and salts, with warm relaxing and purging clysters, were then again applied, but with no better success than they had been before. At the expiration of two days I was apprehensive our affairs were getting into the same channel as usual, in consequence

quence of which I ordered the cold water clysters and wet cloths to be repeated; and allowed him to take half a pint of cold water every hour till he had taken a quart. These again procured a tolerably good stool, and I was in hopes that a proper repetition of purging medicines by the mouth and rectum would now be able to effect their purpose. Still, however, I was mistaken, and at the end of three days more I had the mortification to find his bowels were as obstinately constipated as at first.

Upon attentively considering the case at this period, it occurred to me that the first time the frigid operations were both internally and externally employed, the patient was extremely affected by the cold, and then a profuse evacuation took place; but the second time he seemed

little affected by it, the evacuation was less, and it was longer before it was procured. This determined me to proceed exactly in the same manner as I had done at first, accordingly two pails-full of water were poured over his legs and thighs till such time as he became extremely cold, and then the cold clysters and cold cloths were applied. The event now fully answered my most sanguine wishes, for a profuse evacuation ensued, and I had the pleasure the next morning to find a common purgative had operated freely, and that the intestines were now completely unloaded.

It may not be improper to observe, that, notwithstanding the enormous and uncommonly large quantity of purging medicines which he had taken, so far was a purging from ensuing, that it was necessary

cessary to continue their use, once in two or three days, for some time after the obstruction was removed.

In about three weeks after the patient had overcome this complaint, he became ascitic. As soon as this was perceived, diuretics of various kinds were had recourse to, particularly squills and fox-glove, but without effect. Cream of tartar, in the quantity of an ounce, was given every day; blood and mucus were evacuated by it, but no water. Upon the presumption that the liver was concerned in the production of the disease, large doses of mercurial ointment, with camphor, were rubbed over the region of that viscus; and calomel, to the amount of six grains a day, was for some time administered; but, at the expiration of three weeks, the swelling had in-

creased so much, and was so painful, that it was necessary to draw off the water. Nineteen pints were evacuated; on submitting part of it to a degree of heat sufficient to coagulate the serum, part of it only coagulated, and that in an imperfect degree. The fox-glove was again had recourse to; one grain of the powder was given twice a day for a fortnight: it then occasioned sickness and slight vomiting, but no increase of urine. He was tapped several times; but that, and in short every other remedy, proved merely palliative: he struggled till the beginning of December, and then died.

I very much wished to examine the state of the abdominal viscera after death; but several circumstances concurred in preventing me; I was the less anxious, however, about it, as in the space of near
nine

nine months he had no return of the stoppage in the bowels, except such as readily gave away to a mild dose of common physic,



Remarkable Recovery from Drowning.

James Wright, a private in the West Essex Militia, about 35 years old, had had a fever just one week, which as near as I can learn was the *typhus mitior* of Cullen, or the *febris lenta nervosa* of Huxham: the regiment early yesterday morning marched from Billericay, and Wright thought himself sufficiently well to be conveyed on the baggage waggon; about five o'clock however he grew much worse and fell into a fit (*epilepsia febricosa* I apprehend) which continued half an hour, he was delirious half an hour after, then grew better. About ten o'clock he crossed the river with his company and returned again in the boat under a confused idea of bringing over something he had forgot: when he was two thirds
across

across the river he fell over board, (as was suspected and as I think most likely) in another fit---he immediately sunk, but rose again and continued floating, till boats from the shore could get to his assistance---how long he was in this situation cannot be exactly ascertained: some who saw the whole say 15, some 20 minutes. I think however we may with perfect safety say 12 minutes, and less it scarcely seems possible, when we recollect he was two thirds of a mile distant, that it blew excessively hard and the tide run very strong, besides which something must be allowed for getting the boats ready. The two men, Bray and Wadlow, who first arrived, declare *his body was entirely under water, and his head, they say, was two feet beneath the surface*---his great coat only floated:—whether he lay in this position the whole time is not known,

no one saw his head above water, but his legs were distinctly perceived so perfectly upright that his head must of necessity have been deeply immersed: be it as it may, it seems universally allowed that the body from the moment it was in the water was entirely *passive*--he made not the least attempt to swim, or even the most trifling exertion.

Wadlow kept his head above water until another boat came to his assistance---during this time he did not perceive the least appearance of life, his head was bloated and his face black:--he was then removed into the boat, and on loosing his stock and waistcoat, Stewart says a general agitation seemed to take place;--it was only momentary, and neither that returned, or any other symptom of life was observed while he was conveying on shore, which must have taken up at least

least a quarter of an hour:---five of the men who took him up and brought him on shore are now before me, and on strictly questioning them, *not one perceived the least degree of respiration*---others who carried him to the publick house and were with him at least five minutes before me, say, they did not observe he either breathed or moved.

I found him lying on his belly and face, blood issued from his nostrils in considerable quantity, and the sphincter ani had so far lost the power of contraction, that the fæces passed from him on the least pressure.---I had him moved on the back, and his wet clothes immediately taken from him---this was by no means an operation easily accomplished, as he had on at least three coats, but the exertion of removing them, and the rubbing the water off the chest, and upper part of
the

the body, seemed to have a good effect, for he soon made the first feeble effort to breathe--no pulse however could be perceived: he was instantly dried and warmed, and such means used as the circumstances of the case seemed to point out--the breathing was repeated; after some time a weak respiration was established, and an irregular fluttering at the wrist was perceived, which by degrees became more distinct and strong.

His whole frame became affected with spasmodic agitations, the features of his face violently contorted and many of the first attempts at deglutition seemed to threaten a fresh suffocation.

For several hours after the respiration and circulation were re-established, very great apprehensions were entertained that he would not survive:--the hemorrhage from the nostrils was sufficient to alarm in
his

his weak condition, and he lay in a mild epileptic state an hour or more at a time. At ten in the evening I found him perfectly sensible, and without giddiness or confusion in the head: his pulse very quick, large, and soft. The stimulants which had hitherto been administered pretty freely, tho' with proper care, were now omitted, and an anodyne, with antimonial joined, were given in lieu.

He was visited soon after six this morning:---he had slept very well in the night, and had neither pain or confusion in his head:---he speaks hearty and strong; makes no complaint of any particular organ, and is very clear in his intellects: his fever is very considerable, but it would be wonderful indeed if it should be lessened by such an accident: he however has repeatedly said that he is better this morning, than he was yesterday
morn-

morning before he fell overboard: indeed it is extremely evident that he has entirely overcome the effects of the drowning---his present symptoms being now merely a continuation of those he had before. * I ought to have mentioned it in the body of this letter, but it will do very well to name here, that yesterday morning was excessively cold and bleak---

* The cold to which this poor soldier, labouring under a bad fever, was exposed, without destroying him, brought to my mind the following, related by Mr. Howard; "some sailors in the phrensy of the plague at Constantinople, have thrown themselves into the sea, and it is said that on being taken out they have recovered," Howard on Lazarettos, p. 38.

"In mentioning the gaol fever, I should have added I was well informed that a prisoner brought out as dead from one of the dungeons, on being *washed under the pump*, shewed signs of life, and soon after recovered. Since this I have known other instances of the same kind," Howard's appen. p. 125.

ther-

thermometer 38° the wind blowing quite a storm from N. W. to the influence of which this poor fellow was exposed from five in the morning till ten---the water of course equally cold, and the waves run so high and short that the men say even if he could have swam, and had used every exertion to keep his head above the water, the waves must of necessity have continually covered him.

The nature and degree of the disease the man previously had upon him---his long exposure to the violent wind and cold---the fits---the great length of time he floated in the water, and that there was reason from the concurrent testimony of those who saw him to believe his head was covered---together with the injury the vessels of the head appeared to have
sustained

sustained by the hemorrhage from the nostrils, and the long obliteration and confusion of the senses---constitute this I think one of the most remarkable cases I ever read or heard of: for this reason it may not be improper to mention that if any further testimony is required I can very readily send the thirteen men who were concerned in the case, some of whom were witnesses of his situation under every circumstance I have related.

Feb. 12. 1793.

CASES
OF
TETANUS, TRISMUS,
AND
OPISTHOTONOS.

CASES TERMINATING SUCCESSFULLY.

CASE I.

ELIZABETH WEBB, the subject of the present history, is about twenty five years old, of a short stature, with dark hair and eyebrows, of a brown complexion, soft skin, and of a very irritable constitution, altho' not subject to hysterical affections.—In November 1792 she had a putrid sore throat, and was for some time in an extremely dangerous state; from this she had scarcely recovered when her child died—her distress on this occasion

was very materially increased by the ill usage of her husband, who some time after deserted her and left her destitute ;—hearing he was at Chatham, she went there, but found she had been mis-informed :—weak, low, and distressed to the extreme, she set off with the intention of walking to London ;—before she had reached the village of Northfleet (nine miles from Chatham) she was overcome with fatigue, her sight gradually failed her, and altho' she was nearly unconscious of what she did, she had some faint recollection that she continued to walk half an hour after she had lost her senses *

* It is of importance to remark, as in concurrence with the above circumstances it must have assisted considerably in the production of the disorder—that she always used, when in perfect health, to suffer prodigiously from nervous irritation in the head,

On

On Sunday, March 17, 1793, about noon, she was found in fits on the road—somebody bled her, and attempted to get down remedies of various kinds, but not succeeding, and her complaint appearing of an uncommon nature, she was sent to the parish workhouse, and I saw her about nine o'clock that evening.

She lay perfectly still, without the least apparent motion—and resembled, as nearly as I could imagine, a person who had died in great agonies. The mouth was half open, but the lower jaw was immovably fixed, for with the utmost force I could exert I was not able to move it either one way or the other, even one tenth of inch—her head was drawn round

stomach, &c. at the time the catamenia were upon her: and they made their appearance previous to her setting out in the morning.

to the right side so that the left ear nearly touched the upper part of the sternum, and the face was turned upwards; this was probably effected by the uncommon action of the left sterno—cleido—mastoidæus, for that and the platysma myoides, were as hard as a stone—the trunk and body were bent forward: the arms were folded about the chest, and the legs were drawn up towards the nates—in short every external muscle in the body was instantly rigid and in strong action, and I am satisfied she might have been suspended by any part of the body, even by the little finger (unless the muscles or tendons had broken) without the least relaxation whatever taking place.

Upon accurate examination, a very small pulse was perceivable, and so likewise was a very trivial degree of respiration, but the respiration seemed to be
car-

carried on solely by the motion of the diaphragm. She was insensible to every kind of stimulus—pricking and pinching the skin—the volatile alkali applied to the nose, and even dropped into the eye, did not produce the least effect: repeated attempts had been made to get her to swallow, but to no purpose, for not one drop even of water could be got down.

The situation of this poor woman was dreadful beyond the comprehension of any one, who did not see her—I do not recollect that I was ever shocked so much by the appearance of any patient in my life, and I was so thoroughly impressed with the idea of the utter impossibility of her survival, that I thought it unnecessary even to attempt it.

In the morning however I not only found her alive but I found her better, her jaws were closed altho' equally fixed;
the

the spasms in her throat and stomach were somewhat abated, and her pulse was more distinct, but she did not appear to have the least glimmering of sense.

Trifling as the alteration was, I determined not to lose one moment, or neglect one remedy from which the most distant advantage might be expected—with this view I began by giving some weak brandy and water, and in the space of twenty minutes she swallowed with infinite difficulty, and apparent danger, a small wine glass full;—she was then placed naked on the floor, and cold water was sprinkled and dashed over her till she became so chilled that it could not with prudence be longer continued.

As soon as she was removed to her bed, three drams of the strongest mercurial ointment was ordered to be rubbed into various parts of the body, and ten drams
more

more to be used in the course of the day; the powder of bark with wine was directed to be got down, in large quantities, as often as possible, and fifteen drops of laudanum were to be given every hour. In the morning she began to move one of her legs, towards evening the motion increased, and some glimmerings of sense were evident.

On the 19th she was comparatively very much better in every respect—had so far recovered her speech and her senses as to be able to give some account of herself—she had taken the bark and wine in tolerable quantities, and at times without any material inconvenience—the distress in the throat much abated, but she complained greatly of pain in the head and stomach: from some appearance of soreness in the mouth, the mercurial ointment
was

was discontinued, but every other part of the plan was to be persevered in.

The 20th. In general she was better—that is at particular periods her senses were more perfect—her deglutition less difficult—and the rigidity of the muscles less considerable.—Five or six times in the day, however, she relapsed into a state somewhat similar to that in which I first saw her—at one time she would lay perfectly extended and rigid, exhibiting the most perfect idea of a complete tetanus—at another, the contraction of the great muscles of the back and loins would overcome the resistance of their antagonists, and the body would be bent backwards in the form of an arch, the whole weight resting upon the head and the heels—at another time, the abdominal muscles would have the advantage, so that she would be bent forward in the form of a semicircle—
some-

sometimes she would be drawn, to one side, and sometimes to another—in short, exhibiting in the space, perhaps of an hour, all the variety of those dreadful complaints, described by authors under the names of tetanus, trismus, emprosthotonos, pleurosthotonos and opisthotonos!—while in these fits the jaw was invariably locked, and the power of deglutition entirely suspended—no human force could move a limb without hazard of fracturing its muscles and tendons—no application however potent had the most inconsiderable effect upon her, and when she revived, she expressed herself utterly insensible of whatever had occurred during the fit,

To describe minutely the particulars of this case, would be an endless task indeed;—a complete history would of itself

self occupy a space larger than the whole book, and would after all be attended with little real advantage—it will answer every good purpose to mention that at different times she was taken with every possible variety of that most dangerous, and distressing disorder—the TETANUS—not *one day* elapsed in the space of *fifteen weeks*, without several of these fits attacking her; sometimes they amounted to twenty in a day, and continued upon her ten or even twenty minutes at a time, nay many days together she could scarcely be said to be out of them, for the least noise, or the most trivial motion, occasioned a return of the spasms, and when they were not upon her, she lay in a fainting, insensible state.

It would be equally tedious and uninteresting to relate particularly and at length,

length, the mode of treatment I adopted ; I shall therefore content myself merely with stating the general principles upon which I proceeded.

It has already been mentioned, that on the first day cold water was dashed all over her---that thirteen drams of strong mercurial ointment p. æ. had been rubbed in---and that bark, wine, and laudanum, were directed to be got down in large quantities---this plan of treatment, varied according to the prevailing circumstances, was pursued through the whole complaint.

The application of cold water was not repeated after the first day. The mercurial was continued until it induced its febrile effect and foreness of the gums, which it did in two or three days : and when those symptoms had subsided, they
were

were again excited by a fresh application of the mercury. An ounce of bark, sometimes more, was taken in the day, and at a medium, about a pint and half of wine: the portions of wine and bark however were very uncertain, some days they were taken in large doses, in others scarce any could be taken, on account of the difficulty of swallowing. The quantity of laudanum was regulated by the severity of the spasms—in common she might take three or four drams in the day, but sometimes between two and three ounces.*

* My assistant having occasion to attend a person whose thigh I had amputated in the same house, gave in the space of fourteen hours, *one thousand drops* of laudanum: it was remarked that the laudanum, in whatever quantity she took it, never procured sleep, or impeded the alvine excretion.

I con-

I considered her in very imminent danger until the beginning of May, when the disorder began to abate: the middle of the month she could admit of being taken down stairs, but she could not walk across the room for a fortnight after that time—indeed it was not until the latter end of June that she was able to take even moderate exercise; if she fatigued herself she was certain to suffer more or less from the spasms.

Since then her health has very much mended, but she has been obliged to have frequent recourse to the laudanum, on account of the spasms in her stomach, and in various parts of the body; one third of a common wine glass is her usual dose.

About nine years since, this unfortunate woman, while she was living at Mrs. Hardwines boarding school at Greenwich, drank by mistake a draught of beer, in which a large quantity of powder of cantharides had been mixed, and which was intended by the coachman as a love potion for his fellow servant. In half an hour, she was taken with violent pain in the stomach, and bowels ; great pain and difficulty of making water came on, and at length a total suppression of stools and urine ; the pain was so intense as to render her highly delirious for several days. The urine was regularly drawn off by the catheter—but a vast variety of means were used without success, for the removal of the inflammation, and the obstruction of the bowels—among these she enumerated the following ; an infinite
number

number of purgative medicines of every kind; glisters in great abundance—the fumigation of tobacco, three times a day for five days, continued fifteen or twenty minutes each time—the frequent use of the warm bath—and a copious application of cold water.—The costiveness notwithstanding continued *twenty five* days, and she imputed its removal to the use of crude quicksilver given in the dose of one ounce twice a day. She had not a natural stool for twelve months after. She repeatedly assured me the cantharides did not produce the least tendency towards the effect they were intended to accomplish—that, however, might be owing to the *violence* of the inflammation—a much weaker dose might have produced a different effect.

C A S E II.

Elizabeth Wood, about twenty five years old, naturally of a weak constitution, and much broken down by illnesses of various kinds, was attacked with a low fever:---in a month it abated; and then for a week she was afflicted with spasms in the bowels; while these were upon her, she was taken with what the assistants called Hysterics, but which in reality was a species of Tetanus, for the head and back were very much retracted, so as to form the arch, and there was considerable stiffness in every part, *except the jaw*, which was *never* perceived to be locked, although frequently convulsed, and the tongue was often darted
spas-

spasmodically out of the mouth. There was considerable difficulty in swallowing when the spasms were upon her, but when they were off, she was capable of taking nourishment without any material inconvenience. She was always so much in her senses as to know those about her, but she had often a certain degree of mild delirium and a wildness in her eyes.

The fits continued upon her the greatest part of the day, and for nine days she had not an interval of ten minutes at one time :—at the expiration of the nine days, however, all her spasmodic and convulsive complaints, quitted her somewhat suddenly ; her appetite returned, and she gradually mended. As soon as she began to grow better, a violent itch made its appearance which for a long time withstood the usual remedies.

I did not see this case until the eighth day of the disorder :---very little had then been done either by diet or medicine, for she had taken only three bottles of wine, and a little hollands, during the whole time, and one vial of drops, composed of one ounce of laudanum and two ounces of aromatic spirit.——I directed that forty or fifty drops of laudanum should be given every two hours, and as much wine and spirits as could be got down :---what quantity that was I cannot say, but soon after the spasms quitted her entirely, and she has not had any return of them since.

Cases terminating fatally.

C A S E III.

A young woman twenty years old, employed in getting in the harvest, five or six weeks since run a thorn into her foot, but it healed in a few days without any inconvenience: since then has been exposed to the night air: but it does not appear to have been in a degree any ways uncommon to those kind of people.

On Monday, Sep. 6. in the afternoon, she was taken with a chilliness, and soon after she perceived a foreness, and pain in the mouth, she continued however to pick hops all this day, and by way of proving still further that she was not at

this time materially affected, I was informed that she sung several songs with considerable spirit.

On Tuesday——she walked to the hop ground, about half a quarter of a mile distant: she there picked hops the greater part of the day. In the afternoon she complained of soreness and pain in her bones; and in the evening, for the first time she mentioned the *stiffness of the jaw*.

Wednesday morning——appeared worse: she now complained much of her jaw, and of the pain in the bones: she had sudden convulsive twitches in her back, but none were observed in any other part. She drank some caudle—some milk—and likewise a little beer, but they were taken with some difficulty. In the evening the contraction in her back, and the stiffness in the jaw, were materially increased;

creased; she was however able to set up, and likewise to stand upon her feet.

Thursday morning—she was said to be better, her jaw was more opened, and the pains in her limbs were easier---about noon she became much worse, and was convulsed all over, but at four o'clock she was able, by the assistance of two people, to walk a short distance to the cart that was to remove her to the Parish house.

Friday I saw her at two o'clock.---Her jaws were firmly and compleatly locked—the whole muscular system was in a rigid state, but there was likewise a constant contraction in the muscles of the neck, back, and loins, and which in some measure extended to every other part of the body.---Her pulse was quick and feeble, and her senses appeared very correct.

With

With much pains and patience, I introduced two or three grains of opium into the mouth, and afterwards a table spoonful of wine—on attempting to swallow it, the most dreadful spasms instantly ensued; the body was rigidly bent backward, forming a most perfect opisthotonus and the action of the muscles of the throat and face was so intense as to threaten immediate suffocation: in ten minutes it subsided, and when she had recovered her usual state we made another attempt—the same symptoms ensued, and they returned again on a third trial made a short time after—in every one of these attempts a small quantity of wine and laudanum was got down, and she appeared more composed afterwards, I desired that no opportunity should be omitted of getting them down as often as possible.

I had

I had made several enquiries concerning her having pricked and wounded herself, but was constantly answered in the negative—on repeating the question however several times, she recollected what I have already mentioned at the beginning of the case, that five or six weeks before a thorn had run into her foot—as soon as I had this information I examined the part, and finding the scar very evident, made several deep incisions into and about it, and having nothing better at hand, plugged them with pepper and oil of turpentine, intending to excite as great a degree of inflammation in the part as I could.

Cold water was poured over her several times in considerable quantities, and two ounces of the strongest mercurial ointment was in the course of the afternoon and
night

night rubbed into the leg of the wounded side and into the neck and throat :—none of these remedies however produced any good effect, for she died at seven o'clock next morning, having taken from the time I saw her (seventeen hours) eleven grains of opium—fifty drops of laudanum, half a pint of port, and five glasses of spirits.

C A S E IV.

—— Balfover, a fine stout lad, about eighteen years old, was seen by Mr. Elyard, a young gentleman residing with me, Oct. 10, 1793. He was informed
that

that he had had a forenefs of the throat three or four days, but that the day before it had increafed fo much he could fcarce fwallow---at the fame time a diforder in the ftomach came on, which increafing with the forenefs of the throat, rendered the fwallowing much more difficult.

Mr. Elyard, immediately difcovered that he had the Tetanus and Locked Jaw ---all the mufcles of the body were in a ftate of rigidity, but thofe of the trunk, and inferior extremities, were more permanently affected. When he lay ftill and the fpafms were moderate, his teeth might be feparated the tenth of an inch---but when from agitation of his mind, exertion of his body, an attempt at fwallowing, or any other caufe, the fpafms came on, the fight was truly diftreffing---
it

it appeared as if every muscle in the body was in a state of the most extraordinary exertion—every two or three seconds the body would be bent a little backwards, so as to rest on the head and the heels—in an instant it would become strait, so that the patient would sometimes for a quarter of an hour together he continually jumped up and down in his bed with considerable violence. At the same time the muscles of the face became convulsed to a very considerable degree, insomuch that the features were entirely altered, and the face, particularly round the eyes, was, from the violent action of the muscles, inflamed so as to resemble the erisypelas. The jaws were then perfectly closed; and the intercostals, the diaphragm, and the abdominal muscles, being affected in the same manner, respiration became
very

very materially impeded. It was remarkable, but he appeared to have the free use of his tongue, when every other part of the body capable of spasmodic action, but the surrounding parts more particularly, were so powerfully excited. Deglutition was wholly impracticable when the spasms were upon him, and when they were off, it was attended with considerable inconvenience, very frequently inducing a violent return. His senses appeared at all times to be very perfect.

On examination it was found he had run a thorn into the side of his thumb, and one, half an inch in length, was removed from thence, after having been there a fortnight.

Three drams of strong mercurial ointment were directed to be rubbed in—as
much

much wine and brandy to be given as possible, and one grain of opium every two hours.

11th.—I found very little attention had been paid to the directions given yesterday, on account of the difficulty in getting the wine and medicines down; I however got him to take a dose or two of laudanum and some wine, and poured cold water over his body and extremities for three quarters of an hour—I ordered it to be repeated several times in the day, but in the evening finding neither that or any of the other remedies had been pursued, I had him removed to a house where I was certain every necessary attention would be paid him.

12th.—The plan I directed, had been properly pursued, and the lad was manifestly better. The cold water had been
used;

used ; he had drank a bottle of wine in the night—a pint of milk porridge—and taken three drams of laudanum—his swallowing, at times therefore, was very free.

13th. The fits of spasm, such as were described on the first day, had returned frequently and severely, but did not continue so long—once or twice also in the course of the day, it appeared as if he had a mild epileptic fit, joined with the tetanus, for he foamed at the mouth, and exhibited other characteristic appearances, although he scarcely seemed to have lost his senses. On coming out of these fits as well as the others, he now began to cry out for air—the windows and door were therefore opened, and he was fanned strongly with a large fan ; from this he derived great pleasure, and the cool air refreshed him so much, that he would insist upon being got to the window after

each fit. I proposed to him the application of the cold water at such times, to which he readily consented, and the comfort he experienced from it was so considerable, that he always cried out for it afterwards---indeed it became almost inconvenient to the assistants, for notwithstanding the season, he would remain in the tub half or three quarters of an hour at a time, five or six times a day, or even oftener, with his legs immersed to the calves, and large bowls of fresh cold water continually pouring over all parts of the body. In this state he was more soothed and quiet than in any other; his joints became more flexible and he could open his jaw wider than at any other time. Whenever he had occasion to be removed, it was not in his power to afford himself the most trifling assistance---when he was raised by his head and shoulders, there was not the least

least motion in the spine or at the pelvis, the body was of consequence perfectly strait---raising him by his heels also, the weight of the whole body rested upon them and his head.

14th. He continued much the same as yesterday---at times the rigidity was abated so that the jaws could be separated the third of an inch---the arms also could be moved three or four inches from the body, and the motion of other parts were in proportion, but when the spasms came on, they were nearly as violent as ever, and three or four times he appeared to have a return of the epileptic affection---as this however was but moderate---as his senses were extremely perfect---as he swallowed in the intervals of the spasms freely, and took wine and laudanum in considerable quantities (about an ounce of laudanum in the day)---and as very frequent re-

course was had to the cold water—I entertained considerable expectations that all would end well. On the

15th. In the morning he appeared manifestly better—the return of the spasms was less frequent, and not so intense in their attack—about noon however, the epileptic paroxysm supervened, and he died suddenly.

The difficulty of swallowing in every one of these cases, the distress it sometimes occasioned to the patient when urged so to do, and the utter impossibility of getting one drop down upon many occasions—often induced me to think, that if within
a year

a year, or even a longer period, they had been bit by a dog or any other animal, they would univerfally have been fupposed to labour under the hydrophobia—and I fhould certainly have had the merit of curing that incurable diforder. From thefe cafes therefore, as well as from fome peculiar instances of hyfteria and epilepfia that I have witneffed, I cannot doubt but that all thofe cafes of hydrophobia recorded to have been cured, were not hydrophobia properly fo called, but diforders of the nature I have juft mentioned.

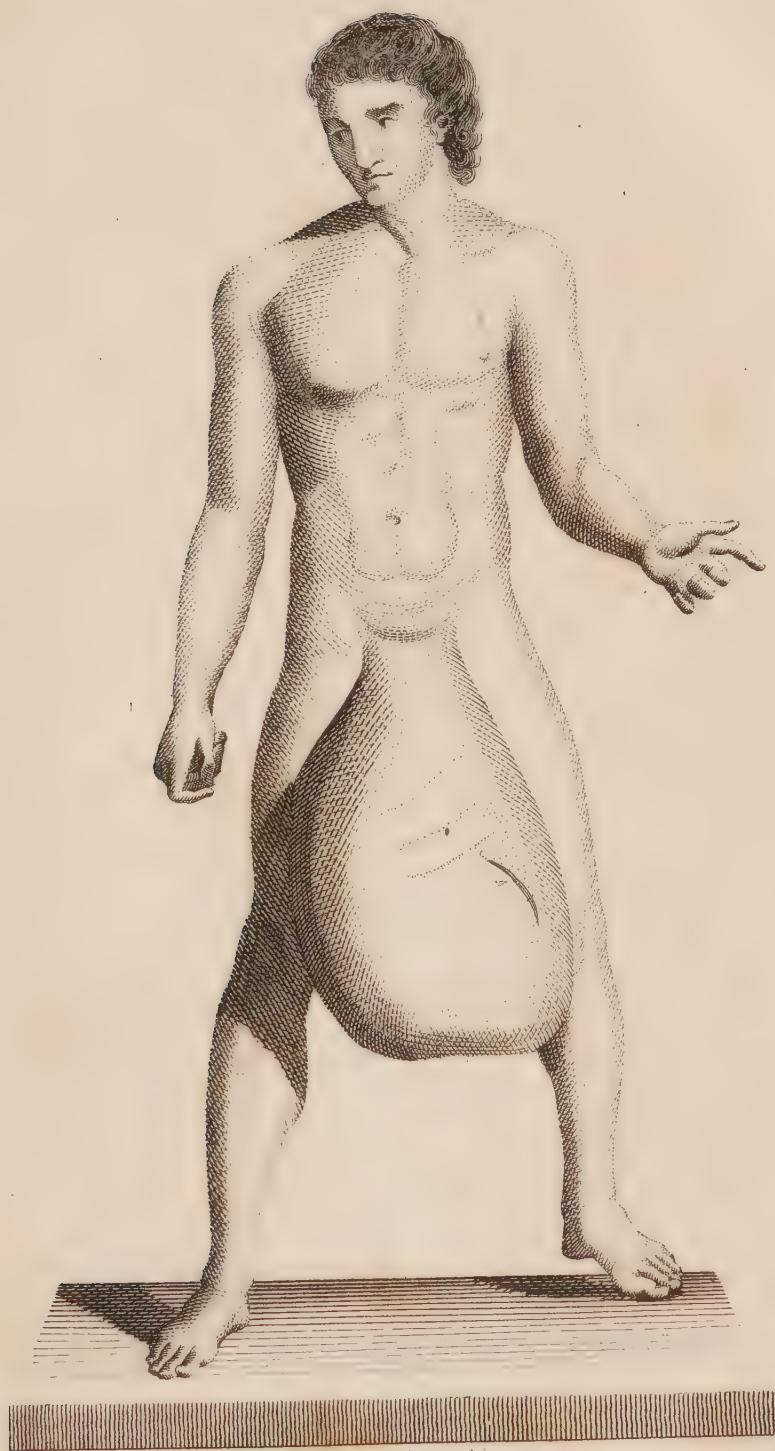
*Account of an Uncommonly large Tumour
of the Scrotum.*

Robert Arnold, whose very extraordinary case I now relate, is thirty one years old. The account he gives of the first appearance of his complaint is not so distinct or satisfactory as I could wish—What I learn is, that about six years ago he received a considerable blow on the lower part of the belly and scrotum, and that soon after he perceived a swelling the size of an egg in the right side of the scrotum. For this he applied to several quacks, and truss-makers, who frequently, he says, returned it into the abdomen, except a portion equal to the size of a walnut; and not only when he first

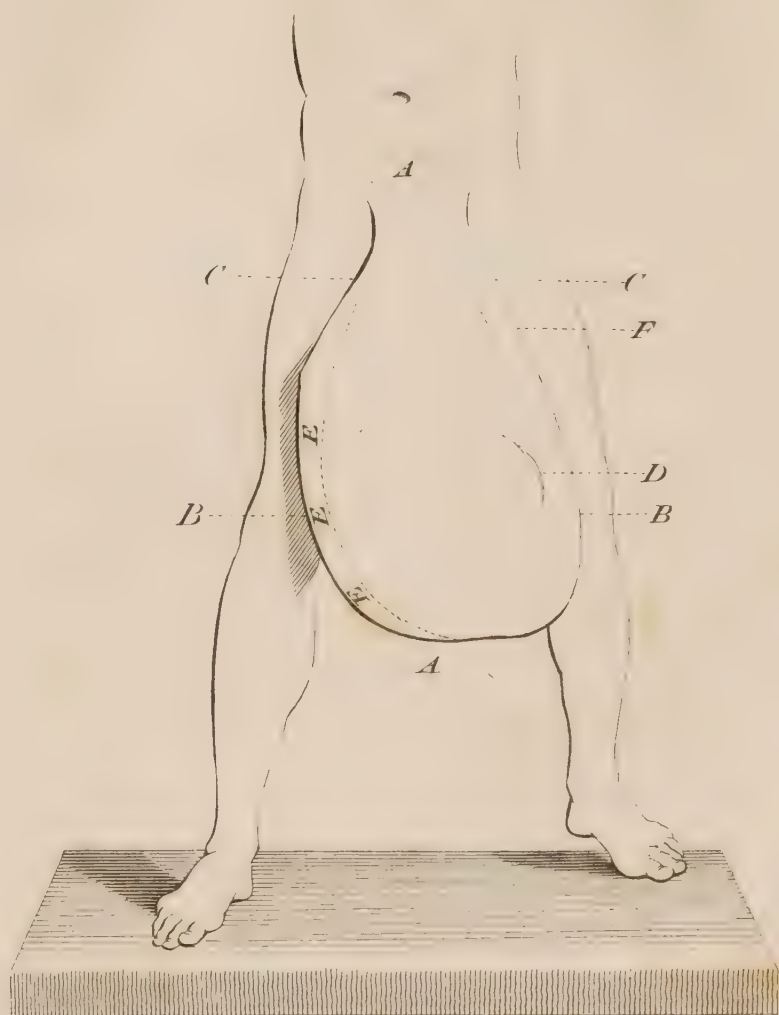
perceived it, but for several years, when it was nearly the size of his head, was he able to return almost the whole contents, but as the tumour was never perfectly reduced, he could not bear the application of the steel truss, all that he did therefore was to use a suspensory, and this I believe was seldom properly applied.

The right testicle was evidently diseased, for when he last felt it, at the time that the tumor was half as large as his head, he could distinctly perceive it to be nearly the size of his fist.

The increase of the tumour during the first four years was not very considerable; he imagines at the end of that period it might be nearly as big as his head: since that time however it has increased in size very rapidly, and when I first saw him
in



EMolpas del. et sculp.



- AA* The length of the Scrotum from the pubis to the bottom 21 inches
BB The breadth of the tumour..... 22 inches
 The circumference at this place is..... 43 $\frac{1}{2}$ in.^s
CC The circumference close to the abdomen..... 30 inches
 The measure from *C* to *C* by *A* is..... 43 inches
D The opening by which the urine passes.
EEE A steatomatous mass within the dotted line.
F The part where the penis & left testis maybe felt.

in March 1794, it had arrived at the astonishing magnitude represented in the annexed plates, in which particular attention has been paid to delineate the parts in their exact proportion.

The following are the present dimensions of the Scrotum,

	Inches.
The length from the pubis to	
the botom - - - - -	21
The breadth at B. B. - - - - -	22
The largest circumference at	
B. B. - - - - -	43 $\frac{1}{2}$
The smallest circumference at	
C. C. - - - - -	30
The segment, or measure from	
C. to C. by A. - - - - -	43

I was at considerable pains to get the weight of this tumour, which I at length accomplished by means of a proper suspensory

penfory and fteelyard, and found that it required to keep it fufpended one inch from the bed on which he was lying, at leaft SIXTY POUNDS.

The tumour which in appearance is not very much unlike an inverted uterus, is pretty regular in its form: fomewhat harder at the upper, and more elastic at the lower part, affording to the touch very much the fame fenfation with old hernia that are flightly ftrictured. It may fometimes be leffened by preffing a portion of its contents into the abdomen; there is an evident paffage of air from the fcrotum, and the fame noife is heard in it which is ufual when air is confined in the inteftines: as foon as the the air efcape into the abdomen, it appears to purfue the tract of the colon, and is prefently after evacuated.

The

The parts forming the scrotum, that is the skin, cellular membrane, and sac, are, as may be imagined, very much thickened; as nearly as I can judge they may be an inch thick. The vessels of the skin particularly the veins are of course very considerably enlarged: the principal trunk is not much less than my little finger. The penis has been hid these two years, but is distinctly to be felt on the upper part of the left side of the tumour, and near it the left testicle of its usual size. The urine is evacuated by a large femilunar opening on the left side, midway between the pubis, and its lower extremity. In making water he stands up and the urine is projected in a full stream immediately from the opening, without running down the tumour, into the pot beneath. On the right side is a long irregular steatoma amounting to perhaps

perhaps six or eight pounds, which is noticed in the plate by a dotted line : this part he says is without feeling.

Mr. Arnold is, I imagine, about five feet five inches high, naturally fat, and was for his age particularly so about the belly : As soon, however, as the tumour began to encrease, he grew less in his belly, and is at this time smaller than natural, altho' the membrana adiposa is there very much loaded with fat : it seems evident therefore that a large share of the contents of the abdomen must have passed into the tumour.—The skin of the lower part of the belly and the perinæum was scarcely drawn at all downwards, and the naval occupied its natural place.

He rises about the usual time in the morning, and is able with great care and attention to get up and down stairs : he has not used any suspensory, so that the
weight

weight of the tumour is extremely inconvenient to be borne more than two minutes at one time, and when he stands he is obliged on account of its size to keep his feet a full yard asunder. As soon as he gets down stairs he lies upon a sofa, and seldom moves from it until he returns to bed.

He has never experienced any difficulty in regard either to his stools or urine. His general health he informs me has been very good, and he at this time appears as hearty, as healthy, and in as good spirits, as any man breathing.

In April 1793, without any previous pain, inflammation or unusual inconvenience of any kind whatever, the lower part of the scrotum burst, and discharged in the space of a few minutes, a gallon of what he expresses to be “a very thick,
liver

liver like, half digested matter"—the opening became pretty considerable, but it healed in about six weeks; the discharge, I was informed, had no feculent or ill smell.

What the precise nature of this tumour may be, is impossible at present exactly to ascertain:---it seems however sufficiently evident, that there is a descent of a very large portion of the contents of the abdomen, and there can be no doubt, from the size of his belly formerly, that the omentum and mesentery are loaded with a considerable quantity of fat: these I imagine occupy the superior part, which, as I mentioned before, is the firmer portion of the tumour: the remainder consists, as I apprehend, of the diseased right testicle,

which

which is most probably by this time much enlarged, and a considerable quantity of some fluid similar perhaps to that which was so plentifully evacuated about a year since.

I am favored with the following history by Mr. Cline, the present respected lecturer on Anatomy and Surgery at St. Thomas's Hospital: it is the case of a gentleman of high literary reputation. It is dated April 2d. 1794.

“Mr. G—— was fifty-seven years old, of a corpulent habit, and had a tumour in the scrotum which extended from the left groin to his knees: it had been forming
ing

ing more than thirty years. The inferior part of the tumour was a hydrocele, and the superior a hernia. The hydrocele had been tapt three times, and at the last operation six ale quarts of fluid were discharged: three days after which he died.

In examining the body, the hernial sac was found to contain nearly all the omentum and the greater part of the colon: these were much inflamed, adhering in many parts to each other and also to the hernial sac. The stomach extended from the diaphragm, almost to the abdominal ring of the left side:—it appeared to have been drawn into this extraordinary situation by the omentum. As the tunica vaginalis had been emptied a short time before his death, it only contained about a quart of fluid. The testicle was without any diseased appearance.”

April 15th. 1794.

METEOROLOGICAL TABLES:

EXHIBITING AN

ACCURATE AND COMPREHENSIVE VIEW

OF THE

VARIATIONS

OF THE

BAROMETER, THERMOMETER, HYGROMETER,

WINDS AND WEATHER;

AND THE

QUANTITIES OF RAIN AND EVAPORATION

IN

EVERY MONTH, FOR NINE YEARS,

From 1786 to 1794 inclusive.

EXPLANATION.

THIS account of the weather is an abstract of probably the most accurate and extensive Journal ever published.—It was undertaken with the view of observing the influence of the perceptible properties of the atmosphere on the human constitution, and the share its changes had in the production and continuance of diseases. Apprehending it might be of material assistance to others who may be desirous of prosecuting the same subject, I willingly make it public, hoping those who are in possession of similar accounts, will, for similar reasons, be induced to follow my example.

THESE Tables require very little explanation. The Columns for the Barometer, Thermometer and Hygrometer, and for the Rain and Evaporation, are sufficiently clear. The direction of the Wind, as well as all the other circumstances, was observed three times

times a day—at 8 in the morning, 3 in the afternoon, and at 10 at night:—the figures therefore shew the number of times the Wind was observed to blow in that particular direction; and all those figures added together will be found to amount to three times the number of days in that month. With respect to the *strength* of the Wind, I have followed the usual method—1, indicates the lowest degree of wind—4, a violent storm—2, and 3, the intermediate degrees. In the column of the Weather, the degrees of *cloudiness* are marked in a similar way—1, the smallest—4, the greatest—and 2, and 3, the intermediate degrees.

DIRECTIONS TO THE BINDER.

THE Meteorological Tables to be placed in succession according to their dates, inserted at the top of the first column in each; to face each other in pairs; and the superfluous margin at the top and bottom should be cut off, to avoid folding up.

1786	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.	RAIN.		EVAPORATION.				DEW. total in month.	
					Points.		Streng.			greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.		
Jan.	H. 30 73	H. 53	*	H. 89	E. 14	S.E. 6	No. 1	0	Clear	0	Cl. 1	*	3.059	*	*	*	*
	L. 28 48	L. 15		L. 40	W. 14	S.W. 35	No. 2	0	Rain	0	Cl. 2						
	M. 29 59	M. 39		M. 96	N. 3	N.E. 3	No. 3	0	Snow	0	Cl. 3						
	V. 02 25	V. 38		V. 49	S. 10	N.W. 8	No. 4	0	Fog	0	Cl. 4						
Feb.	H. 29 98	H. 52	*	H. 85	E. 0	S.E. 0	No. 1	0	Clear	0	Cl. 1	*	0.760	*	*	*	*
	L. 29 16	L. 31		L. 51	W. 47	S.W. 22	No. 2	0	Rain	0	Cl. 2						
	M. 30 04	M. 39		M. 69	N. 7	N.E. 0	No. 3	0	Snow	0	Cl. 3						
	V. 00 82	V. 21		V. 34	S. 5	N.W. 3	No. 4	0	Fog	0	Cl. 4						
Mar.	H. 30 02	H. 50	*	H. 85	E. 3	S.E. 13	No. 1	0	Clear	0	Cl. 1	*	1.483	*	*	*	*
	L. 29 13	L. 29		L. 33	W. 1	S.W. 16	No. 2	0	Rain	0	Cl. 2						
	M. 29 03	M. 36		M. 47	N. 14	N.E. 41	No. 3	0	Snow	0	Cl. 3						
	V. 00 89	V. 21		V. 52	S. 0	N.W. 5	No. 4	0	Fog	0	Cl. 4						
Apr.	H. 30 06	H. 74	*	H. 85	E. 10	S.E. 6	No. 1	0	Clear	0	Cl. 1	*	1.102	*	*	*	*
	L. 29 05	L. 31		L. 28	W. 12	S.W. 39	No. 2	0	Rain	0	Cl. 2						
	M. 29 30	M. 48		M. 65	N. 7	N.E. 5	No. 3	0	Snow	0	Cl. 3						
	V. 01 01	V. 43		V. 57	S. 2	N.W. 9	No. 4	0	Fog	0	Cl. 4						
May	H. 30 30	H. 77	*	H. 72	E. 27	S.E. 1	No. 1	0	Clear	0	Cl. 1	*	2.161	*	*	*	*
	L. 29 50	L. 47		L. 14	W. 15	S.W. 32	No. 2	0	Rain	0	Cl. 2						
	M. 28 33	M. 56		M. 63	N. 0	N.E. 10	No. 3	0	Snow	0	Cl. 3						
	V. 00 80	V. 30		V. 58	S. 6	N.W. 2	No. 4	0	Fog	0	Cl. 4						
June	H. 30 14	H. 80	*	H. 85	E. 6	S.E. 0	No. 1	0	Clear	0	Cl. 1	*	1.805	*	*	*	*
	L. 29 30	L. 49		L. 24	W. 12	S.W. 31	No. 2	0	Rain	0	Cl. 2						
	M. 29 18	M. 64		M. 67	N. 0	N.E. 19	No. 3	0	Snow	0	Cl. 3						
	V. 00 84	V. 31		V. 61	S. 5	N.W. 17	No. 4	0	Fog	0	Cl. 4						
July	H. 30 04	H. 78	*	H. 70	E. 0	S.E. 0	No. 1	0	Clear	0	Cl. 1	*	0.618	*	*	*	*
	L. 29 54	L. 52		L. 20	W. 10	S.W. 71	No. 2	0	Rain	0	Cl. 2						
	M. 30 14	M. 60		M. 35	N. 0	N.E. 3	No. 3	0	Snow	0	Cl. 3						
	V. 00 50	V. 26		V. 50	S. 1	N.W. 8	No. 4	0	Fog	0	Cl. 4						
Aug.	H. 30 20	H. 84	*	H. 72	E. 9	S.E. 6	No. 1	0	Clear	0	Cl. 1	*	2.389	*	*	*	*
	L. 29 14	L. 50		L. 18	W. 4	S.W. 15	No. 2	0	Rain	0	Cl. 2						
	M. 29 58	M. 61		M. 65	N. 0	N.E. 33	No. 3	0	Snow	0	Cl. 3						
	V. 01 06	V. 34		V. 54	S. 2	N.W. 24	No. 4	0	Fog	0	Cl. 4						
Sept.	H. 30 27	H. 78	*	H. 78	E. 0	S.E. 3	No. 1	0	Clear	0	Cl. 1	*	2.726	*	*	*	*
	L. 29 20	L. 45		L. 23	W. 16	S.W. 45	No. 2	0	Rain	0	Cl. 2						
	M. 29 96	M. 53		M. 58	N. 0	N.E. 0	No. 3	0	Snow	0	Cl. 3						
	V. 01 07	V. 33		V. 45	S. 1	N.W. 25	No. 4	0	Fog	0	Cl. 4						
Oct.	H. 30 16	H. 58	*	H. 89	E. 1	S.E. 10	No. 1	0	Clear	0	Cl. 1	*	3.279	*	*	*	*
	L. 28 90	L. 30		L. 44	W. 13	S.W. 24	No. 2	0	Rain	0	Cl. 2						
	M. 29 79	M. 46		M. 71	N. 12	N.E. 05	No. 3	0	Snow	0	Cl. 3						
	V. 01 26	V. 28		V. 45	S. 28	N.W. 0	No. 4	0	Fog	0	Cl. 4						
Nov.	H. 30 40	H. 55	*	H. 90	E. 16	S.E. 0	No. 1	0	Clear	0	Cl. 1	*	2.948	*	*	*	*
	L. 28 60	L. 29		L. 59	W. 0	S.W. 8	No. 2	0	Rain	0	Cl. 2						
	M. 29 72	M. 38		M. 76	N. 32	N.E. 8	No. 3	0	Snow	0	Cl. 3						
	V. 01 80	V. 26		V. 31	S. 11	N.W. 15	No. 4	0	Fog	0	Cl. 4						
Dec.	H. 30 57	H. 60	*	H. 94	E. 0	S.E. 0	No. 1	0	Clear	0	Cl. 1	*	1.466	*	*	*	*
	L. 28 90	L. 30		L. 64	W. 15	S.W. 49	No. 2	0	Rain	0	Cl. 2						
	M. 28 44	M. 38		M. 89	N. 0	N.E. 0	No. 3	0	Snow	0	Cl. 3						
	V. 01 67	V. 30		V. 30	S. 29	N.W. 0	No. 4	0	Fog	0	Cl. 4						
The Year	H. 30 73	H. 84	*	H. 94	E. 86	S.E. 45	No. 1	0	Clear	0	Cl. 1	*	23.796	*	*	*	*
L. 28 48	L. 15	L. 14		W. 156	S.W. 380	No. 2	0	Rain	0	Cl. 2							
M. 28 63	M. 48	M. 66		N. 87	N.E. 132	No. 3	0	Snow	0	Cl. 3							
V. 02 25	V. 69	V. 80		S. 100	N.W. 109	No. 4	0	Fog	0	Cl. 4							

1787	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.	RAIN.		EVAPORATION.				DEW.
					Points.		Strength.			greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	total in month.
Jan.	H. 30 54 L. 29 39 M. 30 10 V. 01 15	H. 51 L. 15 M. 37 V. 36	*	H. 127 L. 75 M. 93 V. 52	E. 19 W. 28 N. 4 S. 0	S.E. 0 S.W. 27 N.E. 12 N.W. 3	No. 1 91 No. 2 2 No. 3 0 No. 4 0		Clear 28 Rain 5 Snow 4 Fog 5	Cl. 1 11 Cl. 2 4 Cl. 3 13 Cl. 4 23	*	0.676	036	000	006	0.192 000
Feb.	H. 30 24 L. 28 42 M. 29 84 V. 01 82	H. 52 L. 32 M. 43 V. 20	*	H. 120 L. 65 M. 94 V. 55	E. 4 W. 3 N. 0 S. 2	S.E. 0 S.W. 67 N.E. 8 N.W. 0	No. 1 67 No. 2 2 No. 3 19 No. 4 0		Clear 18 Rain 12 Snow 0 Fog 1	Cl. 1 7 Cl. 2 16 Cl. 3 11 Cl. 4 19	*	1.214	085	004	023	0.661 015
Mar.	H. 30 42 L. 29 06 M. 29 49 V. 01 36	H. 60 L. 32 M. 45 V. 28	*	H. 110 L. 52 M. 80 V. 58	E. 13 W. 7 N. 1 S. 1	S.E. 9 S.W. 55 N.E. 0 N.W. 7	No. 1 71 No. 2 14 No. 3 7 No. 4 1		Clear 21 Rain 13 Snow 0 Fog 0	Cl. 1 19 Cl. 2 10 Cl. 3 18 Cl. 4 12	*	2.097	104	020	054	1.754 031
Apr.	H. 30 34 L. 28 90 M. 29 75 V. 01 44	H. 64 L. 37 M. 46 V. 27	*	H. 96 L. 44 M. 69 V. 52	E. 4 W. 21 N. 5 S. 0	S.E. 3 S.W. 10 N.E. 31 N.W. 16	No. 1 39 No. 2 27 No. 3 23 No. 4 1		Clear 9 Rain 9 Snow 0 Fog 0	Cl. 1 13 Cl. 2 12 Cl. 3 21 Cl. 4 26	*	1.064	134	010	078	2.671 008
May	H. 30 15 L. 29 20 M. 29 76 V. 00 95	H. 76 L. 36 M. 53 V. 40	*	H. 95 L. 27 M. 56 V. 68	E. 23 W. 13 N. 15 S. 25	S.E. 2 S.W. 0 N.E. 7 N.W. 8	No. 1 61 No. 2 27 No. 3 4 No. 4 1		Clear 22 Rain 6 Snow 0 Fog 0	Cl. 1 22 Cl. 2 15 Cl. 3 16 Cl. 4 12	*	1.693	208	037	135	4.793 016
June	H. 30 00 L. 29 35 M. 29 66 V. 00 65	H. 79 L. 45 M. 59 V. 34	*	H. 75 L. 13 M. 42 V. 62	E. 21 W. 18 N. 1 S. 1	S.E. 7 S.W. 30 N.E. 5 N.W. 7	No. 1 72 No. 2 17 No. 3 1 No. 4 0		Clear 32 Rain 8 Snow 0 Fog 0	Cl. 1 16 Cl. 2 11 Cl. 3 12 Cl. 4 11	*	0.731	265	035	162	4.873 009
July	H. 30 25 L. 29 20 M. 29 65 V. 01 05	H. 83 L. 52 M. 61 V. 31	*	H. 97 L. 12 M. 47 V. 85	E. 6 W. 17 N. 1 S. 3	S.E. 1 S.W. 54 N.E. 3 N.W. 8	No. 1 83 No. 2 8 No. 3 2 No. 4 0		Clear 22 Rain 13 Snow 0 Fog 0	Cl. 1 23 Cl. 2 9 Cl. 3 15 Cl. 4 11	*	5.139	231	050	153	3.104 007
Aug.	H. 30 26 L. 29 10 M. 29 03 V. 01 16	H. 69 L. 50 M. 60 V. 19	*	H. 82 L. 21 M. 46 V. 61	E. 4 W. 11 N. 0 S. 11	S.E. 4 S.W. 45 N.E. 5 N.W. 13	No. 1 78 No. 2 10 No. 3 4 No. 4 1		Clear 25 Rain 12 Snow 0 Fog 0	Cl. 1 18 Cl. 2 15 Cl. 3 18 Cl. 4 5	*	1.102	235	073	135	4.855 004
Sept.	H. 30 30 L. 29 10 M. 29 79 V. 01 20	H. 69 L. 44 M. 57 V. 25	*	H. 87 L. 30 M. 53 V. 57	E. 4 W. 7 N. 0 S. 0	S.E. 0 S.W. 31 N.E. 41 N.W. 7	No. 1 74 No. 2 16 No. 3 0 No. 4 0		Clear 5 Rain 8 Snow 0 Fog 0	Cl. 1 30 Cl. 2 12 Cl. 3 22 Cl. 4 13	*	1.000	129	037	085	2.596 035
Oct.	H. 29 95 L. 29 15 M. 29 47 V. 00 80	H. 63 L. 36 M. 50 V. 27	*	H. 110 L. 37 M. 70 V. 73	E. 0 W. 19 N. 0 S. 7	S.E. 0 S.W. 58 N.E. 1 N.W. 8	No. 1 82 No. 2 9 No. 3 2 No. 4 0		Clear 11 Rain 16 Snow 0 Fog 1	Cl. 1 33 Cl. 2 11 Cl. 3 18 Cl. 4 3	*	2.774	087	001	052	1.632 018
Nov.	H. 30 20 L. 29 03 M. 29 63 V. 01 17	H. 58 L. 23 M. 40 V. 35	*	H. 95 L. 55 M. 74 V. 40	E. 10 W. 6 N. 6 S. 2	S.E. 5 S.W. 41 N.E. 11 N.W. 9	No. 1 63 No. 2 11 No. 3 10 No. 4 1		Clear 15 Rain 6 Snow 0 Fog 2	Cl. 1 31 Cl. 2 11 Cl. 3 15 Cl. 4 10	*	2.191	111	001	026	0.688 000
Dec.	H. 30 27 L. 29 10 M. 30 63 V. 01 17	H. 53 L. 29 M. 42 V. 24	*	H. 110 L. 67 M. 89 V. 43	E. 2 W. 0 N. 6 S. 9	S.E. 1 S.W. 53 N.E. 12 N.W. 10	No. 1 71 No. 2 14 No. 3 8 No. 4 0		Clear 7 Rain 11 Snow 7 Fog 0	Cl. 1 21 Cl. 2 21 Cl. 3 18 Cl. 4 8	*	3.493	036	000	008	0.290 000
The Year	H. 30 54 L. 28 42 M. 29 73 V. 02 12	H. 83 L. 15 M. 49 V. 68	*	H. 127 L. 12 M. 67 V. 115	E. 110 W. 150 N. 039 S. 061	S.E. 032 S.W. 471 N.E. 136 N.W. 096	No. 1 848 No. 2 162 No. 3 80 No. 4 5		Cle. 215 Ra. 119 Snow 11 Fog 9	Cl. 1 244 Cl. 2 147 Cl. 3 197 Cl. 4 153	*	23.174	265	000	076	28.109 143

1788	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.			RAIN.		EVAPORATION.				DEW. total in month.
					Points.		Strength.					greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	
Jan.	H. 30 63	H. 50	*	H. 107	E. 0	S.E. 2	No. 1 28	Clear 22	Cl. 1 9	0.155	0.736	178	000	026	0.794	004		
	L. 29 80	L. 25		L. 65	W. 17	S.W. 37	No. 2 38	Rain 7	Cl. 2 11									
	M. 29 89	M. 39		M. 86	N. 8	N.E. 15	No. 3 21	Snow 0	Cl. 3 26									
	V. 00 83	V. 25		V. 42	S. 3	N.W. 11	No. 4 6	Fog 5	Cl. 4 13									
Feb.	H. 30 15	H. 52	*	H. 113	E. 6	S.E. 29	No. 1 80	Clear 4	Cl. 1 10	0.730	2.598	065	000	020	0.597	000		
	L. 28 60	L. 32		L. 60	W. 0	S.W. 45	No. 2 3	Rain 8	Cl. 2 16									
	M. 29 54	M. 41		M. 93	N. 1	N.E. 3	No. 3 4	Snow 0	Cl. 3 11									
	V. 01 55	V. 20		V. 53	S. 1	N.W. 2	No. 4 0	Fog 0	Cl. 4 38									
Mar.	H. 30 03	H. 58	*	H. 109	E. 25	S.E. 0	No. 1 50	Clear 2	Cl. 1 17	0.694	1.406	138	018	046	1.432	000		
	L. 29 15	L. 30		L. 38	W. 6	S.W. 27	No. 2 38	Rain 2	Cl. 2 21									
	M. 29 48	M. 41		M. 69	N. 1	N.E. 18	No. 3 5	Snow 0	Cl. 3 23									
	V. 00 88	V. 28		V. 71	S. 0	N.W. 16	No. 4 0	Fog 0	Cl. 4 28									
Apr.	H. 30 05	H. 69	*	H. 90	E. 10	S.E. 2	No. 1 57	Clear 15	Cl. 1 16	0.278	0.675	215	038	069	2.061	000		
	L. 29 58	L. 33		L. 27	W. 53	S.W. 9	No. 2 15	Rain 2	Cl. 2 15									
	M. 29 63	M. 50		M. 54	N. 2	N.E. 3	No. 3 15	Snow 2	Cl. 3 20									
	V. 00 47	V. 36		V. 63	S. 1	N.W. 10	No. 4 3	Fog 0	Cl. 4 20									
May	H. 30 28	H. 83	*	H. 91	E. 17	S.E. 1	No. 1 72	Clear 25	Cl. 1 14	0.490	1.246	344	047	161	5.003	002		
	L. 29 45	L. 45		L. 11	W. 16	S.W. 26	No. 2 21	Rain 4	Cl. 2 12									
	M. 29 90	M. 58		M. 39	N. 3	N.E. 21	No. 3 0	Snow 0	Cl. 3 31									
	V. 00 73	V. 38		V. 80	S. 4	N.W. 5	No. 4 0	Fog 0	Cl. 4 7									
June	H. 30 18	H. 68	H. 78	H. 85	E. 5	S.E. 0	No. 1 69	Clear 21	Cl. 1 20	1.240	3.457	318	032	162	4.863	000		
	L. 29 35	L. 47		L. 9	W. 8	S.W. 26	No. 2 15	Rain 10	Cl. 2 15									
	M. 29 80	M. 61		M. 43	N. 6	N.E. 31	No. 3 6	Snow 0	Cl. 3 12									
	V. 00 83	V. 21		V. 76	S. 1	N.W. 13	No. 4 0	Fog 0	Cl. 4 12									
July	H. 30 15	H. 80	H. 96	H. 82	E. 1	S.E. 0	No. 1 75	Clear 7	Cl. 1 26	0.640	2.143	230	086	175	5.421	000		
	L. 29 60	L. 52		L. 20	W. 39	S.W. 45	No. 2 14	Rain 8	Cl. 2 22									
	M. 29 78	M. 59		M. 47	N. 0	N.E. 0	No. 3 4	Snow 0	Cl. 3 16									
	V. 00 55	V. 28		V. 62	S. 1	N.W. 7	No. 4 0	Fog 0	Cl. 4 14									
Aug.	H. 30 37	H. 80	H. 101	H. 82	E. 0	S.E. 0	No. 1 76	Clear 25	Cl. 1 25	0.905	0.738	296	001	137	4.248	003		
	L. 29 15	L. 51		L. 19	W. 42	S.W. 27	No. 2 16	Rain 8	Cl. 2 17									
	M. 29 74	M. 61		M. 44	N. 0	N.E. 5	No. 3 1	Snow 0	Cl. 3 9									
	V. 01 22	V. 29		V. 63	S. 2	N.W. 17	No. 4 0	Fog 0	Cl. 4 9									
Sept.	H. 30 14	H. 76	H. 97	H. 84	E. 8	S.E. 17	No. 1 70	Clear 35	Cl. 1 13	0.605	2.859	138	016	080	2.408	053		
	L. 29 28	L. 47		L. 29	W. 12	S.W. 35	No. 2 7	Rain 4	Cl. 2 13									
	M. 29 87	M. 57		M. 59	N. 1	N.E. 6	No. 3 9	Snow 0	Cl. 3 18									
	V. 00 86	V. 29		V. 55	S. 2	N.W. 9	No. 4 4	Fog 2	Cl. 4 5									
Oct.	H. 30 48	H. 63	H. 74	H. 75	E. 10	S.E. 0	No. 1 62	Clear 26	Cl. 1 10	0.048	0.168	125	024	063	1.941	051		
	L. 29 50	L. 30		L. 34	W. 15	S.W. 35	No. 2 16	Rain 0	Cl. 2 26									
	M. 30 08	M. 50		M. 56	N. 12	N.E. 12	No. 3 12	Snow 0	Cl. 3 21									
	V. 00 98	V. 33		V. 41	S. 3	N.W. 6	No. 4 3	Fog 2	Cl. 4 8									
Nov.	H. 30 39	H. 58	H. 78	H. 86	E. 5	S.E. 10	No. 1 70	Clear 37	Cl. 1 7	0.322	0.735	076	000	026	0.789	084		
	L. 29 49	L. 25		L. 34	W. 1	S.W. 34	No. 2 14	Rain 0	Cl. 2 11									
	M. 30 15	M. 42		M. 64	N. 9	N.E. 21	No. 3 3	Snow 3	Cl. 3 10									
	V. 00 90	V. 33		V. 52	S. 2	N.W. 8	No. 4 3	Fog 3	Cl. 4 19									
Dec.	H. 30 26	H. 44	H. 44	H. 82	E. 0	S.E. 0	No. 1 49	Clear 35	Cl. 1 6	0.042	0.049	050	050	001	0.050	010		
	L. 29 46	L. 11		L. 44	W. 20	S.W. 14	No. 2 27	Rain 0	Cl. 2 5									
	M. 30 14	M. 30		M. 65	N. 9	N.E. 21	No. 3 12	Snow 13	Cl. 3 18									
	V. 00 80	V. 33		V. 38	S. 1	N.W. 28	No. 4 5	Fog 3	Cl. 4 13									
The Year	H. 30 63	H. 83	H. 101	H. 113	E. 87	S.E. 61	No. 1 758	Cle. 254	Cl. 1 173	1.240	16.810	344	000	080	29.607	207		
	L. 28 60	L. 11		L. 09	W. 229	S.W. 360	No. 2 224	Rain 53	Cl. 2 184									
	M. 29 83	M. 49		M. 59	N. 52	N.E. 156	No. 3 92	Snow 18	Cl. 3 215									
	V. 02 03	V. 72		V. 104	S. 21	N.W. 132	No. 4 24	Fog 15	Cl. 4 186									

1789	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER:			RAIN.		EVAPORATION.			DEW.	
					Points.		Strength.					greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	total in month.
Jan.	H. 30 73 L. 28 48 M. 29 55 V. 02 25	H. 53 L. 15 M. 35 V. 38	H. 55	H. 89 L. 40 M. 72 V. 49	E. 14 W. 14 N. 3 S. 10	S.E. 6 S.W. 35 N.E. 3 N.W. 8	No. 1 55 No. 2 21 No. 3 14 No. 4 3	Clear 44 Rain 7 Snow 8 Fog 0	Cl. 1 5 Cl. 2 9 Cl. 3 5 Cl. 4 15		1.050	2.521	072	007	014	0.453	005	
Feb.	H. 29 98 L. 29 16 M. 30 02 V. 00 82	H. 52 L. 31 M. 51 V. 21	H. 52	H. 85 L. 51 M. 67 V. 34	E. 0 W. 47 N. 7 S. 5	S.E. 0 S.W. 22 N.E. 0 N.W. 3	No. 1 38 No. 2 28 No. 3 15 No. 4 3	Clear 18 Rain 4 Snow 0 Fog 0	Cl. 1 12 Cl. 2 26 Cl. 3 14 Cl. 4 10		0.456	2.208	057	008	035	0.989	000	
Mar.	H. 30 02 L. 29 13 M. 29 76 V. 00 89	H. 50 L. 29 M. 36 V. 21	H. 51	H. 85 L. 33 M. 59 V. 52	E. 3 W. 1 N. 14 S. 0	S.E. 13 S.W. 16 N.E. 41 N.W. 5	No. 1 75 No. 2 18 No. 3 0 No. 4 0	Clear 17 Rain 8 Snow 5 Fog 0	Cl. 1 22 Cl. 2 27 Cl. 3 12 Cl. 4 2		0.330	1.478	101	020	025	0.792	005	
Apr.	H. 30 02 L. 29 05 M. 29 65 V. 00 97	H. 74 L. 31 M. 47 V. 43	H. 76	H. 85 L. 28 M. 48 V. 57	E. 10 W. 12 N. 7 S. 2	S.E. 6 S.W. 39 N.E. 5 N.W. 9	No. 1 74 No. 2 13 No. 3 3 No. 4 0	Clear 49 Rain 5 Snow 1 Fog 0	Cl. 1 7 Cl. 2 24 Cl. 3 4 Cl. 4 0		0.390	1.708	260	021	147	4.419	000	
May	H. 30 30 L. 29 50 M. 29 59 V. 00 80	H. 77 L. 47 M. 57 V. 30	H. 80	H. 72 L. 14 M. 42 V. 58	E. 27 W. 15 N. 0 S. 6	S.E. 1 S.W. 32 N.E. 10 N.W. 2	No. 1 51 No. 2 38 No. 3 4 No. 4 0	Clear 20 Rain 0 Snow 0 Fog 0	Cl. 1 39 Cl. 2 24 Cl. 3 8 Cl. 4 2		0.523	1.241	180	010	115	3.571	000	
June	H. 30 14 L. 29 30 M. 29 40 V. 00 84	H. 80 L. 49 M. 57 V. 31	H. 85	H. 85 L. 24 M. 47 V. 61	E. 6 W. 12 N. 0 S. 5	S.E. 0 S.W. 31 N.E. 19 N.W. 17	No. 1 39 No. 2 43 No. 3 3 No. 4 5	Clear 8 Rain 1 Snow 0 Fog 0	Cl. 1 30 Cl. 2 37 Cl. 3 14 Cl. 4 0		0.315	2.574	235	010	123	3.719	000	
July	H. 30 04 L. 29 54 M. 29 55 V. 00 50	H. 78 L. 52 M. 60 V. 26	H. 86	H. 70 L. 20 M. 44 V. 50	E. 0 W. 10 N. 0 S. 1	S.E. 0 S.W. 71 N.E. 3 N.W. 8	No. 1 38 No. 2 39 No. 3 11 No. 4 5	Clear 2 Rain 8 Snow 0 Fog 0	Cl. 1 35 Cl. 2 38 Cl. 3 8 Cl. 4 2		0.465	2.563	248	037	150	4.661	000	
Aug.	H. 30 20 L. 29 14 M. 29 95 V. 01 05	H. 78 L. 48 M. 64 V. 30	H. 88	H. 72 L. 18 M. 42 V. 54	E. 9 W. 4 N. 0 S. 2	S.E. 6 S.W. 15 N.E. 33 N.W. 24	No. 1 54 No. 2 31 No. 3 5 No. 4 3	Clear 10 Rain 3 Snow 0 Fog 0	Cl. 1 35 Cl. 2 39 Cl. 3 5 Cl. 4 1		0.486	1.459	245	025	169	5.252	000	
Sept.	H. 30 27 L. 29 20 M. 30 88 V. 01 07	H. 78 L. 45 M. 57 V. 33	H. 86	H. 78 L. 23 M. 50 V. 55	E. 0 W. 0 N. 16 S. 1	S.E. 3 S.W. 45 N.E. 0 N.W. 25	No. 1 51 No. 2 38 No. 3 1 No. 4 0	Clear 3 Rain 9 Snow 0 Fog 0	Cl. 1 6 Cl. 2 61 Cl. 3 9 Cl. 4 2		0.496	2.367	177	032	103	3.106	059	
Oct.	H. 30 16 L. 28 90 M. 29 56 V. 01 26	H. 58 L. 30 M. 47 V. 28	H. 78	H. 89 L. 44 M. 66 V. 45	E. 1 W. 13 N. 12 S. 28	S.E. 10 S.W. 24 N.E. 5 N.W. 0	No. 1 62 No. 2 24 No. 3 4 No. 4 3	Clear 52 Rain 7 Snow 0 Fog 0	Cl. 1 20 Cl. 2 3 Cl. 3 7 Cl. 4 4		0.760	4.030	190	018	082	2.567	145	
Nov.	H. 30 40 L. 28 60 M. 29 74 V. 01 80	H. 55 L. 29 M. 38 V. 26	H. 55	H. 90 L. 59 M. 73 V. 31	E. 16 W. 0 N. 32 S. 11	S.E. 0 S.W. 8 N.E. 8 N.W. 15	No. 1 30 No. 2 53 No. 3 5 No. 4 2	Clear 53 Rain 8 Snow 0 Fog 0	Cl. 1 26 Cl. 2 0 Cl. 3 3 Cl. 4 0		0.583	2.705	060	002	026	0.789	035	
Dec.	H. 30 57 L. 28 90 M. 29 84 V. 01 67	H. 60 L. 30 M. 42 V. 30	H. 64	H. 94 L. 64 M. 75 V. 30	E. 0 W. 15 N. 0 S. 29	S.E. 0 S.W. 49 N.E. 0 N.W. 0	No. 1 37 No. 2 49 No. 3 7 No. 4 0	Clear 33 Rain 14 Snow 0 Fog 0	Cl. 1 28 Cl. 2 11 Cl. 3 5 Cl. 4 2		0.335	0.791	085	005	037	1.163	034	
The Year	H. 30 73 L. 28 48 M. 29 79 V. 02 25	H. 80 L. 15 M. 49 V. 65	H. 88	H. 94 L. 14 M. 57 V. 80	E. 86 W. 143 N. 91 S. 100	S.E. 45 S.W. 387 N.E. 127 N.W. 116	No. 1 604 No. 2 395 No. 3 72 No. 4 24	Cle. 309 Ra. 074 Sno. 014 Fog 0	Cl. 1 265 Cl. 2 299 Cl. 3 94 Cl. 4 40		1.050	25.645	260	002	085	31.481	293	

1790	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.	RAIN.		EVAPORATION.				DEW.
					Points.		Strength.			greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	total in month.
Jan.	H. 30 45	H. 52	H. 52	H. 94	E. 0	S.E. 5	No. 1	67	Clear 40	Cl. 1	36					
	L. 29 10	L. 29		L. 55	W. 9	S.W. 49	No. 2	17	Rain 2	Cl. 2	8	0.130	0.806	075	005	030
	M. 30 06	M. 38		M. 73	N. 0	N.E. 16	No. 3	9	Snow 0	Cl. 3	2					008
	V. 01 35	V. 23		V. 39	S. 8	N.W. 6	No. 4	0	Fog 2	Cl. 4	3					
Feb.	H. 30 61	H. 71	H. 71	H. 85	E. 0	S.E. 0	No. 1	77	Clear 51	Cl. 1	22					
	L. 29 87	L. 30		L. 44	W. 11	S.W. 49	No. 2	5	Rain 2	Cl. 2	2	0.025	0.032	038	003	047
	M. 30 84	M. 54		M. 63	N. 5	N.E. 0	No. 3	2	Snow 0	Cl. 3	2					1.333
	V. 00 74	V. 41		V. 41	S. 0	N.W. 19	No. 4	0	Fog 4	Cl. 4	1					038
Mar.	H. 30 60	H. 65	H. 65	H. 80	E. 2	S.E. 2	No. 1	79	Clear 58	Cl. 1	16					
	L. 29 85	L. 30		L. 30	W. 7	S.W. 9	No. 2	9	Rain 4	Cl. 2	6	0.126	0.156	081	005	064
	M. 29 47	M. 44		M. 54	N. 3	N.E. 45	No. 3	5	Snow 0	Cl. 3	5					1.985
	V. 00 75	V. 35		V. 50	S. 10	N.W. 15	No. 4	0	Fog 3	Cl. 4	1					013
Apr.	H. 30 30	H. 60	H. 63	H. 84	E. 3	S.E. 7	No. 1	44	Clear 62	Cl. 1	4					
	L. 29 25	L. 33		L. 21	W. 0	S.W. 18	No. 2	28	Rain 15	Cl. 2	2	0.710	2.153	204	005	100
	M. 29 82	M. 43		M. 47	N. 4	N.E. 50	No. 3	8	Snow 0	Cl. 3	5					3.000
	V. 01 05	V. 27		V. 63	S. 3	N.W. 5	No. 4	10	Fog 0	Cl. 4	2					002
May	H. 30 30	H. 71	H. 77	H. 78	E. 5	S.E. 8	No. 1	74	Clear 56	Cl. 1	15					
	L. 29 40	L. 39		L. 18	W. 5	S.W. 27	No. 2	15	Rain 12	Cl. 2	4	0.560	1.918	225	015	126
	M. 29 85	M. 55		M. 46	N. 0	N.E. 32	No. 3	4	Snow 0	Cl. 3	5					3.922
	V. 00 90	V. 32		V. 60	S. 9	N.W. 7	No. 4	0	Fog 0	Cl. 4	1					015
June	H. 30 40	H. 88	H. 96	H. 75	E. 4	S.E. 10	No. 1	73	Clear 62	Cl. 1	14					
	L. 29 15	L. 44		L. 18	W. 10	S.W. 41	No. 2	16	Rain 4	Cl. 2	7	0.115	0.509	396	081	196
	M. 29 99	M. 59		M. 39	N. 0	N.E. 8	No. 3	1	Snow 0	Cl. 3	3					5.894
	V. 01 25	V. 44		V. 57	S. 2	N.W. 15	No. 4	0	Fog 0	Cl. 4	0					005
July	H. 30 60	H. 69	H. 80	H. 76	E. 0	S.E. 0	No. 1	74	Clear 34	Cl. 1	34					
	L. 29 40	L. 19		L. 19	W. 4	S.W. 60	No. 2	13	Rain 6	Cl. 2	13	0.668	2.296	264	039	136
	M. 30 11	M. 59		M. 43	N. 5	N.E. 9	No. 3	5	Snow 0	Cl. 3	6					4.217
	V. 01 20	V. 50		V. 57	S. 2	N.W. 22	No. 4	1	Fog 0	Cl. 4	0					004
Aug.	H. 30 10	H. 78	H. 82	H. 72	E. 0	S.E. 1	No. 1	71	Clear 50	Cl. 1	14					
	L. 29 15	L. 50		L. 20	W. 15	S.W. 57	No. 2	17	Rain 11	Cl. 2	14	1.295	2.671	212	036	125
	M. 29 85	M. 61		M. 45	N. 3	N.E. 0	No. 3	5	Snow 0	Cl. 3	4					3.996
	V. 00 95	V. 28		V. 52	S. 0	N.W. 17	No. 4	0	Fog 0	Cl. 4	0					006
Sept.	H. 30 20	H. 71	H. 85	H. 75	E. 3	S.E. 3	No. 1	78	Clear 31	Cl. 1	40					
	L. 29 45	L. 41		L. 22	W. 7	S.W. 38	No. 2	8	Rain 6	Cl. 2	9	0.160	0.497	162	050	101
	M. 30 46	M. 54		M. 43	N. 6	N.E. 14	No. 3	4	Snow 0	Cl. 3	2					3.034
	V. 00 75	V. 30		V. 53	S. 0	N.W. 19	No. 4	0	Fog 2	Cl. 4	0					000
Oct.	H. 30 30	H. 71	H. 75	H. 78	E. 0	S.E. 5	No. 1	60	Clear 50	Cl. 1	5					
	L. 29 52	L. 33		L. 30	W. 0	S.W. 27	No. 2	18	Rain 7	Cl. 2	18	0.325	1.266	150	008	058
	M. 29 69	M. 60		M. 54	N. 2	N.E. 22	No. 3	12	Snow 0	Cl. 3	6					1.823
	V. 00 78	V. 38		V. 48	S. 7	N.W. 30	No. 4	3	Fog 3	Cl. 4	4					000
Nov.	H. 30 30	H. 72	H. 72	H. 84	E. 4	S.E. 18	No. 1	70	Clear 39	Cl. 1	12					
	L. 29 27	L. 33		L. 38	W. 0	S.W. 28	No. 2	10	Rain 8	Cl. 2	24	1.242	3.194	072	008	034
	M. 29 81	M. 43		M. 63	N. 5	N.E. 29	No. 3	10	Snow 0	Cl. 3	5					1.049
	V. 01 03	V. 39		V. 46	S. 0	N.W. 6	No. 4	0	Fog 1	Cl. 4	1					000
Dec.	H. 30 30	H. 52	H. 52	H. 82	E. 0	S.E. 3	No. 1	59	Clear 46	Cl. 1	8					
	L. 29 10	L. 28		L. 45	W. 15	S.W. 38	No. 2	15	Rain 13	Cl. 2	15	0.823	3.223	087	006	023
	M. 28 76	M. 40		M. 67	N. 4	N.E. 3	No. 3	11	Snow 3	Cl. 3	3					0.715
	V. 01 20	V. 24		V. 37	S. 10	N.W. 20	No. 4	8	Fog 3	Cl. 4	2					035
The Year	H. 30 61	H. 88	H. 96	H. 94	E. 21	S.E. 62	No. 1	826	Cle. 579	Cl. 1	220					
	L. 29 10	L. 19		L. 18	W. 83	S.W. 441	No. 2	171	Rain 90	Cl. 2	122	1.295	18.721	396	003	086
	M. 29 89	M. 50		M. 53	N. 37	N.E. 219	No. 3	76	Snow 3	Cl. 3	48					31.902
	V. 01 51	V. 69		V. 76	S. 51	N.W. 181	No. 4	22	Fog 18	Cl. 4	15					126

1791	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER:	RAIN.		EVAPORATION.				DEW.
					Points.		Strength.			greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	total in month.
Jan.	H. 30 48 L. 28 50 M. 29 58 V. 01 98	H. 49 L. 31 M. 42 V. 18	H. 61	H. 88 L. 55 M. 72 V. 33	E. 0 W. 10 N. 0 S. 0	S.E. 0 S.W. 80 N.E. 0 N.W. 3	No. 1 32 No. 2 47 No. 3 11 No. 4 3		Clear 45 Rain 13 Snow 0 Fog 0	Cl. 1 18 Cl. 2 12 Cl. 3 1 Cl. 4 4	1.330	4.442	054	012	028	0.888 003
Feb.	H. 30 40 L. 29 40 M. 29 89 V. 01 00	H. 49 L. 31 M. 37 V. 18	H. 57	H. 76 L. 40 M. 65 V. 36	E. 8 W. 4 N. 3 S. 5	S.E. 0 S.W. 33 N.E. 5 N.W. 26	No. 1 45 No. 2 26 No. 3 12 No. 4 1		Clear 35 Rain 8 Snow 1 Fog 0	Cl. 1 17 Cl. 2 11 Cl. 3 8 Cl. 4 4	0.847	3.388	668	021	029	0.831 005
Mar.	H. 30 68 L. 29 00 M. 30 16 V. 01 68	H. 58 L. 28 M. 43 V. 30	H. 74	H. 72 L. 30 M. 49 V. 42	E. 2 W. 1 N. 0 S. 0	S.E. 0 S.W. 49 N.E. 8 N.W. 33	No. 1 69 No. 2 16 No. 3 8 No. 4 0		Clear 54 Rain 0 Snow 0 Fog 0	Cl. 1 12 Cl. 2 12 Cl. 3 12 Cl. 4 3	0.424	0.986	106	016	059	1.853 005
Apr.	H. 30 07 L. 29 10 M. 29 73 V. 00 97	H. 69 L. 39 M. 49 V. 30	H. 75	H. 80 L. 28 M. 59 V. 52	E. 10 W. 6 N. 0 S. 3	S.E. 13 S.W. 28 N.E. 23 N.W. 7	No. 1 45 No. 2 4 No. 3 41 No. 4 0		Clear 39 Rain 4 Snow 0 Fog 2	Cl. 1 15 Cl. 2 17 Cl. 3 12 Cl. 4 1	0.903	1.688	155	012	082	2.460 005
May	H. 30 30 L. 29 50 M. 30 09 V. 00 80	H. 65 L. 38 M. 39 V. 27	H. 78	H. 76 L. 14 M. 34 V. 62	E. 10 W. 5 N. 0 S. 0	S.E. 0 S.W. 38 N.E. 26 N.W. 14	No. 1 41 No. 2 39 No. 3 13 No. 4 0		Clear 48 Rain 5 Snow 0 Fog 1	Cl. 1 11 Cl. 2 13 Cl. 3 8 Cl. 4 7	0.540	0.493	250	038	144	4.486 000
June	H. 30 20 L. 29 50 M. 29 90 V. 00 70	H. 79 L. 40 M. 57 V. 39	H. 98	H. 64 L. 10 M. 29 V. 54	E. 1 W. 5 N. 6 S. 6	S.E. 6 S.W. 22 N.E. 22 N.W. 22	No. 1 52 No. 2 38 No. 3 0 No. 4 0		Clear 45 Rain 4 Snow 0 Fog 0	Cl. 1 4 Cl. 2 29 Cl. 3 8 Cl. 4 0	0.473	1.039	277	039	166	5.005 000
July	H. 30 22 L. 29 96 M. 29 86 V. 00 26	H. 76 L. 51 M. 58 V. 25	H. 80	H. 73 L. 22 M. 43 V. 51	E. 6 W. 5 N. 0 S. 0	S.E. 0 S.W. 70 N.E. 3 N.W. 9	No. 1 63 No. 2 27 No. 3 3 No. 4 0		Clear 38 Rain 9 Snow 0 Fog 1	Cl. 1 12 Cl. 2 16 Cl. 3 12 Cl. 4 5	0.447	2.373	268	016	137	4.274 000
Aug.	H. 30 28 L. 29 58 M. 30 02 V. 00 70	H. 75 L. 52 M. 62 V. 23	H. 98	H. 80 L. 18 M. 43 V. 62	E. 14 W. 0 N. 0 S. 5	S.E. 0 S.W. 49 N.E. 19 N.W. 6	No. 1 35 No. 2 47 No. 3 11 No. 4 0		Clear 54 Rain 4 Snow 0 Fog 0	Cl. 1 8 Cl. 2 13 Cl. 3 8 Cl. 4 6	0.205	1.040	234	028	159	4.951 000
Sept.	H. 30 30 L. 29 50 M. 30 06 V. 00 80	H. 82 L. 48 M. 57 V. 34	H. 95	H. 78 L. 28 M. 48 V. 50	E. 6 W. 2 N. 9 S. 0	S.E. 3 S.W. 21 N.E. 31 N.W. 18	No. 1 59 No. 2 27 No. 3 4 No. 4 0		Clear 46 Rain 2 Snow 0 Fog 5	Cl. 1 15 Cl. 2 13 Cl. 3 9 Cl. 4 0	0.312	0.419	235	015	131	3.956 064
Oct.	H. 30 40 L. 29 15 M. 29 65 V. 01 25	H. 62 L. 32 M. 48 V. 30	H. 83	H. 71 L. 30 M. 45 V. 41	E. 7 W. 0 N. 0 S. 3	S.E. 8 S.W. 61 N.E. 3 N.W. 11	No. 1 36 No. 2 49 No. 3 8 No. 4 0		Clear 35 Rain 9 Snow 0 Fog 1	Cl. 1 14 Cl. 2 19 Cl. 3 8 Cl. 4 7	0.732	2.327	136	010	046	1.446 024
Nov.	H. 30 30 L. 28 65 M. 29 63 V. 01 65	H. 53 L. 33 M. 43 V. 20	H. 54	H. 86 L. 30 M. 62 V. 56	E. 7 W. 0 N. 5 S. 0	S.E. 21 S.W. 51 N.E. 6 N.W. 0	No. 1 47 No. 2 25 No. 3 18 No. 4 0		Clear 54 Rain 21 Snow 0 Fog 1	Cl. 1 5 Cl. 2 1 Cl. 3 3 Cl. 4 5	0.860	3.600	097	012	041	1.245 010
Dec.	H. 30 20 L. 29 05 M. 29 29 V. 01 15	H. 49 L. 20 M. 36 V. 29	H. 52	H. 80 L. 40 M. 56 V. 40	E. 2 W. 4 N. 4 S. 2	S.E. 6 S.W. 52 N.E. 1 N.W. 22	No. 1 40 No. 2 32 No. 3 10 No. 4 11		Clear 59 Rain 10 Snow 0 Fog 0	Cl. 1 0 Cl. 2 5 Cl. 3 15 Cl. 4 4	0.522	1.695	053	007	016	0.510 000
The Year	H. 30 68 L. 28 50 M. 29 82 V. 02 18	H. 82 L. 20 M. 47 V. 62	H. 98	H. 88 L. 10 M. 50 V. 78	E. 73 W. 42 N. 27 S. 24	S.E. 57 S.W. 554 N.E. 147 N.W. 171	No. 1 564 No. 2 377 No. 3 139 No. 4 15		Cle. 552 Ra. 89 Snow 1 Fog 11	Cl. 1 131 Cl. 2 161 Cl. 3 104 Cl. 4 46	1.330	23.490	277	007	086	32.905 116

1792	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.			RAIN.		EVAPORATION.				DEW. total in month.
					Points.		Strength.					greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	
Jan.	H. 30 40 L. 28 92 M. 29 39 V. 01 48	H. 47 L. 18 M. 38 V. 29	H. 50	H. 80 L. 50 M. 68 V. 30	E. 3 W. 4 N. 0 S. 0	S.E. 9 S.W. 23 N.E. 6 N.W. 48	No. 1 51 No. 2 40 No. 3 2 No. 4 0	Clear 27 Rain 11 Snow 3 Fog 1	Cl. 1 10 Cl. 2 20 Cl. 3 12 Cl. 4 9	0.315	2.069	072	040	019	0.604	005		
	H. 30 22 L. 29 40 M. 29 93 V. 00 82	H. 52 L. 25 M. 38 V. 27	H. 60	H. 76 L. 50 M. 61 V. 26	E. 13 W. 13 N. 3 S. 2	S.E. 6 S.W. 17 N.E. 10 N.W. 23	No. 1 54 No. 2 20 No. 3 13 No. 4 0	Clear 57 Rain 8 Snow 5 Fog 6	Cl. 1 2 Cl. 2 8 Cl. 3 1 Cl. 4 0	0.690	2.360	080	032	039	1.149	000		
	H. 30 20 L. 29 25 M. 29 42 V. 00 95	H. 64 L. 40 M. 42 V. 24	H. 72	H. 76 L. 67 M. 68 V. 09	E. 0 W. 0 N. 0 S. 0	S.E. 28 S.W. 41 N.E. 10 N.W. 14	No. 1 40 No. 2 20 No. 3 33 No. 4 0	Clear 68 Rain 5 Snow 0 Fog 0	Cl. 1 3 Cl. 2 17 Cl. 3 0 Cl. 4 0	0.402	2.391	105	027	039	1.224	000		
	H. 30 25 L. 29 40 M. 29 74 V. 00 85	H. 68 L. 40 M. 51 V. 28	H. 78	H. 79 L. 30 M. 55 V. 49	E. 0 W. 3 N. 0 S. 5	S.E. 20 S.W. 28 N.E. 25 N.W. 09	No. 1 10 No. 2 54 No. 3 26 No. 4 0	Clear 51 Rain 8 Snow 0 Fog 0	Cl. 1 8 Cl. 2 14 Cl. 3 9 Cl. 4 0	0.830	3.566	308	035	098	2.967	000		
May	H. 30 45 L. 29 55 M. 29 80 V. 00 90	H. 69 L. 44 M. 51 V. 25	H. 78	H. 72 L. 12 M. 36 V. 60	E. 2 W. 2 N. 12 S. 0	S.E. 3 S.W. 55 N.E. 6 N.W. 13	No. 1 2 No. 2 82 No. 3 8 No. 4 1	Clear 51 Rain 4 Snow 0 Fog 0	Cl. 1 11 Cl. 2 19 Cl. 3 8 Cl. 4 0	0.222	1.358	179	052	090	2.796	000		
	H. 30 25 L. 29 55 M. 30 00 V. 00 70	H. 79 L. 48 M. 54 V. 31	H. 88	H. 74 L. 16 M. 39 V. 58	E. 4 W. 0 N. 6 S. 3	S.E. 16 S.W. 38 N.E. 13 N.W. 10	No. 1 64 No. 2 18 No. 3 6 No. 4 2	Clear 35 Rain 8 Snow 0 Fog 0	Cl. 1 12 Cl. 2 21 Cl. 3 10 Cl. 4 4	0.366	2.147	270	038	102	3.087	000		
	H. 30 15 L. 29 49 M. 28 70 V. 00 66	H. 70 L. 52 M. 59 V. 18	H. 84	H. 72 L. 28 M. 43 V. 44	E. 1 W. 2 N. 1 S. 1	S.E. 2 S.W. 56 N.E. 13 N.W. 17	No. 1 49 No. 2 42 No. 3 2 No. 4 0	Clear 32 Rain 10 Snow 0 Fog 0	Cl. 1 12 Cl. 2 21 Cl. 3 15 Cl. 4 3	1.010	5.195	270	022	088	2.739	031		
	H. 30 30 L. 29 55 M. 29 15 V. 00 75	H. 81 L. 54 M. 63 V. 27	H. 92	H. 60 L. 18 M. 37 V. 42	E. 3 W. 4 N. 1 S. 8	S.E. 3 S.W. 48 N.E. 20 N.W. 6	No. 1 27 No. 2 55 No. 3 7 No. 4 4	Clear 50 Rain 8 Snow 0 Fog 1	Cl. 1 8 Cl. 2 18 Cl. 3 6 Cl. 4 2	1.760	3.940	296	038	178	5.531	000		
Sept.	H. 30 30 L. 29 00 M. 29 85 V. 01 30	H. 68 L. 35 M. 54 V. 33	H. 70	H. 50 L. 40 M. 40 V. 10	E. 0 W. 0 N. 0 S. 2	S.E. 8 S.W. 67 N.E. 3 N.W. 10	No. 1 28 No. 2 48 No. 3 10 No. 4 4	Clear 40 Rain 10 Snow 0 Fog 2	Cl. 1 8 Cl. 2 22 Cl. 3 6 Cl. 4 2	0.575	2.053	143	014	060	1.829	000		
	H. 30 48 L. 29 24 M. 29 85 V. 01 24	H. 58 L. 38 M. 49 V. 20	H. 65	H. 50 L. 40 M. 40 V. 10	E. 0 W. 4 N. 1 S. 1	S.E. 9 S.W. 38 N.E. 30 N.W. 10	No. 1 16 No. 2 68 No. 3 8 No. 4 1	Clear 23 Rain 11 Snow 0 Fog 1	Cl. 1 20 Cl. 2 19 Cl. 3 14 Cl. 4 5	0.350	2.761	064	008	034	1.164	017		
	H. 30 40 L. 29 40 M. 29 96 V. 01 00	H. 56 L. 34 M. 45 V. 22	H. 56	H. 48 L. 40 M. 40 V. 08	E. 1 W. 7 N. 3 S. 1	S.E. 18 S.W. 47 N.E. 13 N.W. 0	No. 1 29 No. 2 55 No. 3 4 No. 4 2	Clear 40 Rain 4 Snow 0 Fog 1	Cl. 1 16 Cl. 2 20 Cl. 3 6 Cl. 4 3	0.231	0.637	074	010	036	1.108	008		
	H. 30 22 L. 29 05 M. 29 65 V. 01 17	H. 58 L. 30 M. 40 V. 28	H. 58	H. 40 L. 38 M. 39 V. 02	E. 0 W. 7 N. 1 S. 0	S.E. 9 S.W. 42 N.E. 9 N.W. 25	No. 1 12 No. 2 58 No. 3 18 No. 4 5	Clear 20 Rain 8 Snow 0 Fog 1	Cl. 1 19 Cl. 2 29 Cl. 3 11 Cl. 4 5	0.585	2.197	049	005	018	0.570	000		
The Year	H. 30 48 L. 28 92 M. 28 78 V. 01 56	H. 81 L. 18 M. 48 V. 63	H. 92	H. 80 L. 12 M. 46 V. 68	E. 27 W. 46 N. 28 S. 23	S.E. 131 S.W. 500 N.E. 158 N.W. 185	No. 1 382 No. 2 560 No. 3 137 No. 4 19	Cle. 494 Rain 95 Snow 08 Fog 13	Cl. 1 129 Cl. 2 228 Cl. 3 98 Cl. 4 33	1.760	30.674	308	005	666	24.768	061		

1793	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.				RAIN.		EVAPORATION.				DEW.	
					Points.		Strength.						greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	total in month.	
Jan.	H. 30 50 L. 29 00 M. 28 99 V. 01 50	H. 48 L. 24 M. 37 V. 24	H. 52	H. 98 L. 30 M. 49 V. 68	E. 0 W. 3 N. 3 S. 2	S.E. 9 S.W. 46 N.E. 17 N.W. 13	No. 1 6 No. 2 87 No. 3 0 No. 4 0	Clear 33 Rain 7 Snow 0 Fog 3	Cl. 1 12 Cl. 2 20 Cl. 3 11 Cl. 4 7	2.320	2.864	052	008	012	0.381	000				
	Feb.	H. 30 15 L. 29 20 M. 29 68 V. 00 95		H. 48 L. 28 M. 40 V. 20	H. 58	H. 78 L. 50 M. 66 V. 28	E. 0 W. 18 N. 1 S. 2	S.E. 3 S.W. 44 N.E. 2 N.W. 14	No. 1 10 No. 2 66 No. 3 5 No. 4 3								Clear 37 Rain 5 Snow 0 Fog 0	Cl. 1 4 Cl. 2 25 Cl. 3 7 Cl. 4 6		
		Mar.		H. 30 25 L. 29 00 M. 29 77 V. 01 25		H. 60 L. 32 M. 41 V. 28	H. 65	H. 80 L. 40 M. 65 V. 40	E. 6 W. 10 N. 0 S. 0								S.E. 1 S.W. 49 N.E. 27 N.W. 0	No. 1 34 No. 2 33 No. 3 21 No. 4 5	Clear 41 Rain 5 Snow 0 Fog 0	Cl. 1 6 Cl. 2 21 Cl. 3 14 Cl. 4 6
				Apr.		H. 30 20 L. 29 45 M. 29 92 V. 00 75		H. 56 L. 31 M. 41 V. 25	H. 75								H. 78 L. 15 M. 51 V. 63	E. 6 W. 5 N. 3 S. 1	S.E. 13 S.W. 10 N.E. 21 N.W. 31	No. 1 0 No. 2 86 No. 3 4 No. 4 0
May			H. 30 40 L. 29 30 M. 29 93 V. 01 10			H. 64 L. 40 M. 48 V. 24		H. 78		H. 70 L. 15 M. 44 V. 55	E. 6 W. 3 N. 7 S. 0	S.E. 11 S.W. 13 N.E. 10 N.W. 43	No. 1 1 No. 2 89 No. 3 3 No. 4 0	Clear 51 Rain 2 Snow 0 Fog 0	Cl. 1 5 Cl. 2 24 Cl. 3 9 Cl. 4 2					
	June		H. 30 10 L. 29 70 M. 29 92 V. 00 40		H. 74 L. 46 M. 56 V. 28	H. 85				H. 60 L. 15 M. 31 V. 45	E. 2 W. 0 N. 3 S. 1	S.E. 9 S.W. 43 N.E. 6 N.W. 26	No. 1 5 No. 2 83 No. 3 2 No. 4 0	Clear 36 Rain 2 Snow 0 Fog 0	Cl. 1 8 Cl. 2 34 Cl. 3 8 Cl. 4 2					
		July	H. 30 25 L. 29 80 M. 29 99 V. 00 45		H. 88 L. 50 M. 64 V. 38		H. 110			H. 80 L. 05 M. 39 V. 75	E. 5 W. 2 N. 1 S. 0	S.E. 3 S.W. 50 N.E. 22 N.W. 10	No. 1 15 No. 2 78 No. 3 0 No. 4 0	Clear 61 Rain 4 Snow 0 Fog 0	Cl. 1 8 Cl. 2 9 Cl. 3 11 Cl. 4 0					
			Aug.	H. 30 30 L. 29 45 M. 29 92 V. 00 85	H. 80 L. 50 M. 60 V. 30				H. 98	H. 70 L. 20 M. 45 V. 50	E. 4 W. 8 N. 1 S. 1	S.E. 20 S.W. 41 N.E. 2 N.W. 16	No. 1 16 No. 2 67 No. 3 10 No. 4 0	Clear 58 Rain 4 Snow 0 Fog 0	Cl. 1 5 Cl. 2 14 Cl. 3 8 Cl. 4 4					
Sept.				H. 30 30 L. 29 35 M. 29 94 V. 00 95	H. 68 L. 43 M. 53 V. 25			H. 74		H. 75 L. 38 M. 49 V. 37	E. 0 W. 6 N. 1 S. 4	S.E. 0 S.W. 43 N.E. 17 N.W. 19	No. 1 46 No. 2 42 No. 3 2 No. 4 0	Clear 27 Rain 14 Snow 0 Fog 4	Cl. 1 19 Cl. 2 20 Cl. 3 4 Cl. 4 2					
	Oct.			H. 30 55 L. 29 15 M. 29 95 V. 01 40	H. 68 L. 32 M. 51 V. 35	H. 83				H. 80 L. 50 M. 61 V. 30	E. 0 W. 10 N. 0 S. 0	S.E. 9 S.W. 59 N.E. 3 N.W. 12	No. 1 17 No. 2 71 No. 3 5 No. 4 0	Clear 47 Rain 6 Snow 0 Fog 4	Cl. 1 3 Cl. 2 14 Cl. 3 13 Cl. 4 6					
		Nov.		H. 30 34 L. 29 00 M. 29 61 V. 01 34	H. 57 L. 28 M. 45 V. 29		H. 59			H. 90 L. 50 M. 45 V. 40	E. 6 W. 4 N. 8 S. 2	S.E. 32 S.W. 18 N.E. 10 N.W. 10	No. 1 0 No. 2 87 No. 3 3 No. 4 0	Clear 41 Rain 7 Snow 0 Fog 1	Cl. 1 6 Cl. 2 14 Cl. 3 12 Cl. 4 9					
			Dec.	H. 30 34 L. 28 45 M. 29 70 V. 01 89	H. 56 L. 28 M. 42 V. 28				H. 56	H. 90 L. 55 M. 75 V. 35	E. 0 W. 2 N. 0 S. 0	S.E. 9 S.W. 46 N.E. 30 N.W. 6	No. 1 0 No. 2 86 No. 3 7 No. 4 0	Clear 13 Rain 17 Snow 0 Fog 8	Cl. 1 8 Cl. 2 28 Cl. 3 9 Cl. 4 10					
The Year				H. 30 55 L. 28 45 M. 30 61 V. 02 10	H. 88 L. 24 M. 48 V. 64			H. 110		H. 98 L. 05 M. 51 V. 93	E. 35 W. 71 N. 28 S. 13	S.E. 119 S.W. 462 N.E. 167 N.W. 200	No. 1 150 No. 2 875 No. 3 62 No. 4 8	Cle. 496 Ra. 77 Snow 1 Fog 20	Cl. 1 91 Cl. 2 241 Cl. 3 111 Cl. 4 58					

1794	BAROM.	Ther. Shade.	Ther. Sun.	Hygr.	WINDS.				WEATHER.			RAIN.		EVAPORATION.				DEW.	
					Points.		Strength.					greatest in 1 day.	total in month.	greatest in 1 day.	least in 1 day.	mean daily.	total in month.	total in month.	
Jan.	H. 30 50 L. 28 40 M. 30 09 V. 02 10	H. 50 L. 20 M. 34 V. 30	H. 50	H. 95 L. 60 M. 72 V. 35	E. 7 W. 2 N. 2 S. 0	S.E. 3 S.W. 41 N.E. 20 N.W. 18	No. 1 0 No. 2 86 No. 3 4 No. 4 3	Clear 34 Rain 2 Snow 3 Fog 7	Cl. 1 2 Cl. 2 13 Cl. 3 21 Cl. 4 11			425	855	055	010	006	199	000	
	H. 30 30 L. 29 40 M. 28 62 V. 00 90	H. 62 L. 34 M. 47 V. 28	H. 64	H. 90 L. 45 M. 71 V. 45	E. 0 W. 0 N. 2 S. 4	S.E. 3 S.W. 68 N.E. 0 N.W. 7	No. 1 9 No. 2 52 No. 3 23 No. 4 0	Clear 41 Rain 6 Snow 0 Fog 0	Cl. 1 0 Cl. 2 15 Cl. 3 20 Cl. 4 2			285	804	135	025	038	1.073	000	
	H. 30 50 L. 29 40 M. 29 92 V. 01 10	H. 70 L. 40 M. 46 V. 30	H. 85	H. 90 L. 40 M. 69 V. 50	E. 0 W. 2 N. 0 S. 3	S.E. 6 S.W. 58 N.E. 24 N.W. 0	No. 1 4 No. 2 76 No. 3 11 No. 4 2	Clear 45 Rain 18 Snow 0 Fog 7	Cl. 1 0 Cl. 2 8 Cl. 3 8 Cl. 4 7			620	1.787	145	005	046	1.453	003	
	H. 30 40 L. 29 05 M. 30 07 V. 01 35	H. 78 L. 42 M. 51 V. 36	H. 85	H. 92 L. 15 M. 56 V. 77	E. 4 W. 1 N. 5 S. 6	S.E. 12 S.W. 44 N.E. 5 N.W. 13	No. 1 47 No. 2 26 No. 3 16 No. 4 1	Clear 52 Rain 13 Snow 0 Fog 0	Cl. 1 0 Cl. 2 9 Cl. 3 13 Cl. 4 3			270	1.528	170	040	094	2.827	000	
May	H. 30 60 L. 29 40 M. 29 92 V. 01 20	H. 68 L. 40 M. 52 V. 28	H. 74	H. 75 L. 20 M. 41 V. 55	E. 3 W. 1 N. 4 S. 0	S.E. 5 S.W. 29 N.E. 18 N.W. 33	No. 1 9 No. 2 67 No. 3 17 No. 4 0	Clear 46 Rain 10 Snow 0 Fog 0	Cl. 1 0 Cl. 2 16 Cl. 3 15 Cl. 4 6			1.300	2.635	205	020	107	3.340	017	
	H. 30 30 L. 29 65 M. 30 00 V. 00 65	H. 80 L. 45 M. 58 V. 35	H. 90	H. 68 L. 15 M. 46 V. 53	E. 15 W. 9 N. 0 S. 3	S.E. 3 S.W. 4 N.E. 25 N.W. 31	No. 1 12 No. 2 69 No. 3 9 No. 4 0	Clear 58 Rain 1 Snow 0 Fog 0	Cl. 1 1 Cl. 2 16 Cl. 3 8 Cl. 4 6			250	507	270	040	180	5.400	000	
	H. 30 35 L. 29 15 M. 29 90 V. 01 20	H. 79 L. 58 M. 66 V. 21	H. 92	H. 50 L. 15 M. 34 V. 35	E. 7 W. 12 N. 0 S. 2	S.E. 0 S.W. 51 N.E. 16 N.W. 5	No. 1 43 No. 2 49 No. 3 1 No. 4 0	Clear 49 Rain 2 Snow 0 Fog 0	Cl. 1 4 Cl. 2 26 Cl. 3 6 Cl. 4 6			200	815	286	110	219	6.809	000	
	H. 30 30 L. 29 55 M. 30 97 V. 00 75	H. 76 L. 50 M. 61 V. 26	H. 92	H. 55 L. 15 M. 48 V. 40	E. 0 W. 5 N. 1 S. 0	S.E. 3 S.W. 34 N.E. 20 N.W. 30	No. 1 44 No. 2 44 No. 3 5 No. 4 0	Clear 44 Rain 5 Snow 0 Fog 0	Cl. 1 3 Cl. 2 15 Cl. 3 15 Cl. 4 11			260	1.331	220	030	141	4.376	000	
Sept.	H. 30 30 L. 29 40 M. 29 82 V. 00 90	H. 66 L. 36 M. 55 V. 30	H. 72	H. 70 L. 40 M. 61 V. 30	E. 0 W. 5 N. 0 S. 0	S.E. 12 S.W. 22 N.E. 27 N.W. 24	No. 1 18 No. 2 61 No. 3 11 No. 4 0	Clear 36 Rain 12 Snow 0 Fog 0	Cl. 1 4 Cl. 2 19 Cl. 3 9 Cl. 4 10			2.391	4.433	095	015	056	1.705	000	
	H. 30 30 L. 29 15 M. 29 76 V. 01 15	H. 68 L. 36 M. 52 V. 32	H. 72	H. 70 L. 40 M. 54 V. 30	E. 1 W. 3 N. 0 S. 4	S.E. 2 S.W. 57 N.E. 3 N.W. 23	No. 1 17 No. 2 70 No. 3 5 No. 4 1	Clear 45 Rain 22 Snow 0 Fog 0	Cl. 1 0 Cl. 2 11 Cl. 3 11 Cl. 4 4			750	4.968	090	010	039	1.228	018	
	H. 30 10 L. 29 10 M. 29 84 V. 01 00	H. 60 L. 30 M. 55 V. 30	H. 60	H. 80 L. 40 M. 59 V. 40	E. 0 W. 0 N. 0 S. 3	S.E. 23 S.W. 45 N.E. 13 N.W. 6	No. 1 13 No. 2 64 No. 3 12 No. 4 1	Clear 31 Rain 17 Snow 0 Fog 2	Cl. 1 0 Cl. 2 23 Cl. 3 11 Cl. 4 6			680	4.525	040	010	016	506	010	
	H. 30 40 L. 29 65 M. 29 89 V. 00 75	H. 60 L. 20 M. 38 V. 40	H. 60	H. 75 L. 50 M. 57 V. 25	E. 7 W. 2 N. 0 S. 17	S.E. 6 S.W. 21 N.E. 24 N.W. 16	No. 1 22 No. 2 64 No. 3 4 No. 4 3	Clear 40 Rain 4 Snow 5 Fog 9	Cl. 1 1 Cl. 2 9 Cl. 3 15 Cl. 4 10			535	1.260	060	010	007	237	038	
The Year	H. 30 60 L. 28 40 M. 29 90 V. 02 20	H. 80 L. 20 M. 51 V. 60	H. 92	H. 95 L. 15 M. 55 V. 80	E. 44 W. 42 N. 14 S. 42	S.E. 78 S.W. 474 N.E. 195 N.W. 206	No. 1 238 No. 2 728 No. 3 118 No. 4 11	Cle. 521 Ra. 112 Snow 8 Fog 25	Cl. 1 15 Cl. 2 180 Cl. 3 152 Cl. 4 82			2.391	25.448	286	010	079	29.153	086	

A Comparative View of the Quantity of Rain and Evaporation in every Month for Nine Years—1786—1794.

	1786.		1787.		1788.		1789.		1790.		1791.		1792.		1793.		1794.	
	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.	Rain.	Evap.
Jan.	3.059	0.676	0.192	0.736	0.794	2.521	0.403	0.806	0.934	4.442	0.888	2.069	0.604	2.864	0.381	0.855	0.199	
Feb.	0.760	1.214	0.661	2.598	0.597	2.208	0.989	0.232	1.333	3.388	0.831	2.360	1.149	1.255	0.708	0.804	1.073	
Mar.	1.483	2.097	1.754	1.406	1.432	1.478	0.792	0.156	1.985	0.986	1.853	2.391	1.224	2.041	0.794	1.787	1.453	
April	1.102	1.064	2.671	0.675	2.061	1.241	3.571	2.153	3.000	1.688	2.460	3.566	2.967	2.917	1.746	1.528	2.827	
May	2.161	1.693	4.793	1.246	5.003	1.708	4.419	1.918	3.922	0.493	4.486	1.358	2.796	0.635	2.641	2.635	3.340	
June	1.805	0.731	4.873	3.457	4.863	2.574	3.719	0.509	5.894	1.039	5.005	2.147	3.087	1.206	3.418	0.507	5.400	
July	0.618	5.139	3.104	2.143	5.421	2.563	4.661	2.296	4.217	2.373	4.274	5.195	2.739	2.246	5.131	0.815	6.809	
Aug.	2.389	1.102	4.855	2.738	4.248	1.459	5.252	2.671	3.996	1.040	4.951	3.940	5.531	1.430	4.231	1.331	4.376	
Sept.	2.726	1.000	2.596	2.859	2.408	2.367	3.106	0.497	3.034	0.419	3.956	2.053	1.829	2.902	2.290	4.433	1.705	
Oct.	3.279	2.774	1.632	0.168	1.941	4.030	2.567	1.266	1.823	2.327	1.446	2.761	1.164	1.504	1.629	4.968	1.228	
Nov.	2.948	2.191	0.688	0.735	0.789	2.705	0.789	3.194	1.049	3.600	1.245	0.637	1.108	2.139	0.591	4.525	0.506	
Dec.	1.466	3.493	0.290	0.049	0.050	0.791	1.163	3.223	0.715	1.695	0.510	2.197	0.570	2.402	0.265	1.260	0.237	
Total	23.796	23.174	28.109	18.810	29.607	25.645	31.431	18.721	31.902	23.490	31.905	30.674	24.768	23.541	23.825	25.448	29.153	
The Mean of Nine Years, is—of RAIN, 23.699—of EVAPORATION, 25.638.																		

The Highest, Lowest, and Mean Height, and the Greatest Variation of the Barometer, Thermometer, and Hygrometer, for Nine Years—1786—1794.

	Barom.	Therm.	Hygrom.
Highest	30.73	88	127
Lowest	28.40	11	5
Mean	29.66	48	56
Variation	02.33	77	122

The Mean Number of Observations of the Direction of the Winds for Nine Years, have been in the following Proportion :

E. 63	S. E. . . . 70
W. 107	S. W. . . . 448
N. 43	N. E. . . . 159
S. 48	N. W. . . . 155

The Mean Number of Observations of the Appearances of the Sky, for Nine Years, have been in the following Proportion :

Clear . . . 380	Cloudy 1 140
Rain 78	Cloudy 2 173
Snow 7	Cloudy 3 113
Foggy . . . 12	Cloudy 4 68

